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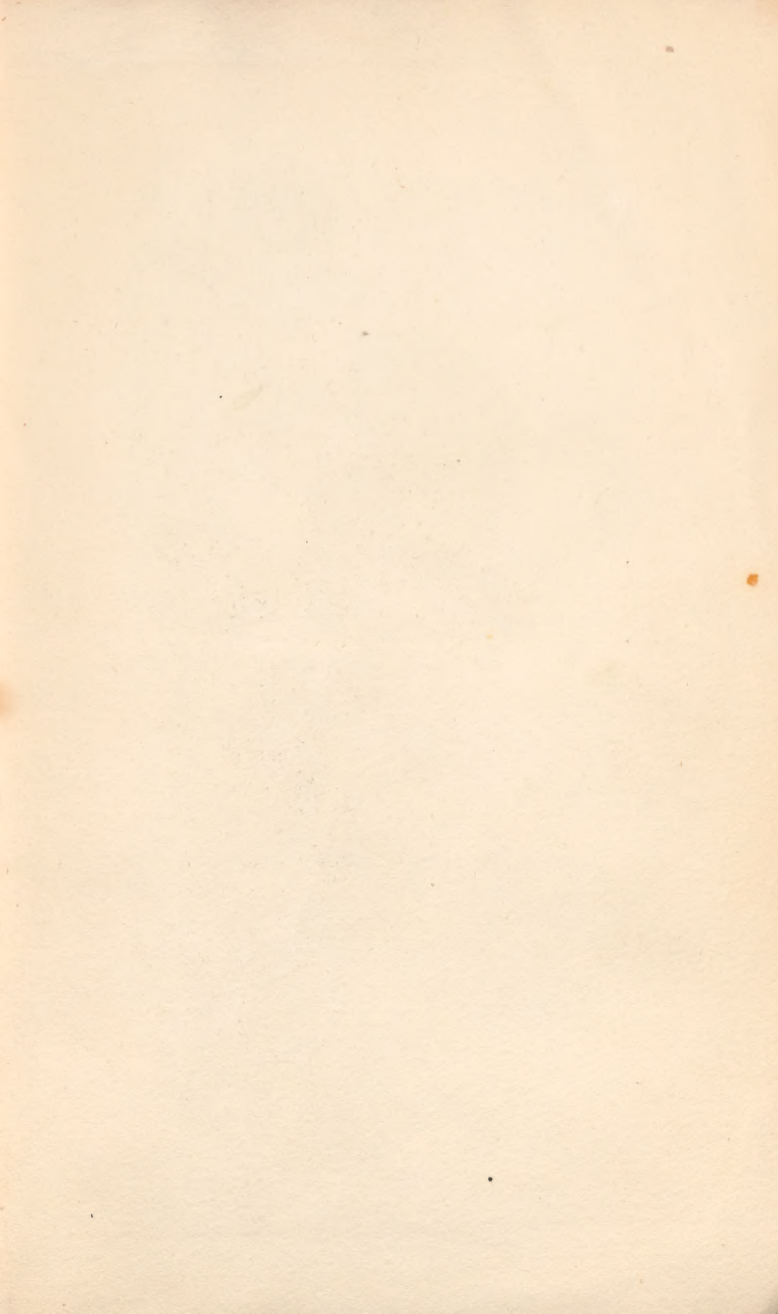
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Poultry: their breeding, rearing, disease



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Poultry.

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POULTRY:

THEIR

BREEDING, REARING, DISEASES,

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General Management.

BY

WALTER B. DICKSON.

A NEW EDITION, REVISED AND IMPROVED.

LONDON:

WILLIAM SMITH, 113, FLEET STREET.

MDCCCXLVII.

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LONDON:
BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.

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THE present Edition has been carefully revised and corrected; some fresh Woodcuts have been introduced, and new matter added, so as to bring the Work down to the present time.

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FIG. 1.—BANKIVA COCK.

FIG. 2.—JAGO COCK AND HEN.

FIG. 3.—SPANISH COCK AND HEN.

POULTRY.

THE various kinds of fowls found in British poultry-yards are said to be nearly all sprung from the Bankiva fowl. It is true that Buffon supposes the domestic fowls to be descended from the Jungle cock, a native of the continent of India; and some writers fancy that they may be traced to the Capercailzie, or cock of the woods, formerly abundant in the north of Scotland; but these suppositions seem now to have few supporters, and it therefore appears only necessary here to say a few words of the Bankiva fowls, as the original species, before describing the tame varieties.

THE BANKIVA FOWL.

(*Gallus Bankiva*, Temminck; *Ayam Bankiva*, Javanese.)

THIS fowl (see *fig. 1*) is a native of the island of Java, and is characterised by a red indented comb, red wattles, and ash-grey legs and feet.

The cock has a thin indented or scalloped comb, and wattles under the mouth; the tail a little elevated above

the level of the rump, and the feathers disposed somewhat in the form of tiles. The feathers of the neck are long, falling down, and rounded at the tips, and are of the finest gold colour. The head and neck are fawn-coloured; the wing-coverts are dusky-brownish and black; the tail and belly are black. The hen is of a dusky ash-grey and yellowish colour, and has her comb and beard much smaller than the cock, with no feathers on the neck besides the long hackles.

On examining this species, it will be found to exhibit many points of resemblance with our common fowls of the smaller or middle size. The form and colour are the same, the comb and wattles are similar, and the hen so much resembles a common hen, that it is difficult to distinguish it, except by the less erect slant of the tail. This rise of the tail is much more apparent in the male; but it may be observed, that in all the wild species known, the tail does not rise so high above the level of the rump, nor is it so abundantly provided with covering feathers, as in some domestic breeds. Probably the superabundance of nourishment, and the assiduous care of man, have contributed to the greater development of all the organs of the domestic breeds; and several of these, such as the tufted fowl, the *Hamburgh*, the double-combed, and others, show that domestication produces infinite varieties.

THE DOMESTIC, OR BARN-DOOR FOWL.

(*Gallus Bankiva*, a. *domesticus*, Temminck ; *Phasianus Gallus domesticus*, Latham ; *Alector*, Klein ; *Coq commun à-crête*, Buffon ; *Das gemeine Ram oder Haushuhn*, Bechstein ; *Gallo commune*, Italian.)

THE distinguishing characters of the domestic cock are a thin indented or scalloped comb, with wattles on each side under the beak ; the tail rising in an arch above the level of the rump ; the feathers of the neck long and line-like ; the colour finely variegated.

The hen has her comb and wattles smaller than those of the cock, is smaller in size, and has the colours more dull and sombre.

The influence of domestication in the barn-door fowl having produced alterations in the entire form of the body, and in the comb and wattles, it is difficult to indicate the races which owe their origin to the same stock or source ; but the races nearest the primitive species, are those, which have undergone the fewest changes from taming, and have produced, by inter-alliance, the breed of dunghill fowls with large comb and wattles, and the breed of tufted fowls, with small comb and wattles, in which the juices proper to form the comb and wattles appear to have been expended in the production of the tuft of feathers which ornaments the head :—also the breeds of fowls whose legs and feet are more or less covered with feathers, the origin of which may be attributed to superabundance of nutriment, that has in this instance produced feathers on the legs, as it

has formed a tuft on the head of the tufted fowl; and in the race of *Hamburgh* cocks, which have the head hooded, and the feathers stretched back over the ears.

The following are the principal sub-varieties: --

1.—THE DUNGHILL FOWL.

THIS is the commonest form of the domestic fowl. The cock has a large thin comb and wattles, and the brilliant plumage of the wild species; but the best hens are generally of dingy colours, though there is almost infinite variety in their shades. When fowls of the common kind are white, they are said to be not so healthy as the others, and the hens are seldom good layers. White chickens should therefore be fattened for the table, particularly as the colour of their skin is much better than that of the darker kinds, and their flesh more delicate. The legs of the common fowls should be short, white, and shining; and their bodies round and plump.

2.—THE GAME FOWL.

THIS is the kind called the *English* fowl by *Buffon* and the *French* writers; it is more slender in the body, the neck, the bill, and the legs, than the other sorts, and the colours, particularly of the cock, are very bright and showy. The flesh is white, tender, and delicate, and on this account marketable; but the propensity to fight is so strong among the chickens, that they often injure, or even kill one another, and hence it is difficult to rear them in numbers. The eggs are but

small in size, but, like the flesh, are much esteemed for superior delicacy.

Sportsmen who breed game-cocks for fighting, have numerous named varieties, such as piles, black-reds, silver-breasted ducks, birchin ducks, dark greys, mealy greys, blacks, spangles, furnaces, pole-cats, cuckoos, gingers, duns, red duns, smoky duns, among all of which, according to Sketchley, good birds may be found; but he thinks the following eight are superior to any others, namely, dark reds, dark black-breasted reds, dark black-breasted birchin ducks, dark black-breasted berry birchins, silver black-breasted duck-wing greys, clear mealy greys, dark black-breasted greys, and red duns.

“The feather,” he adds, “of the true black-breasted reds should be a clear vivid dark-red, without any shade of the black whatever, extending from the back to the extremities,—the red upon the back above, and black beneath; the upper convex side of the wing equally red and black, even those surrounding the posterior; the whole of the tail feathers black, the tip of the wing also, with black beak and black legs. The brood-hen for such a cock should be the dark partridge-coloured hen, bright-red hackled above, black beneath, clear-brick breasted, and such to the posterior; black beak and legs.

“The mealy-grey, which may be ranked next in value to the true dark-grey, originated from the black and mealy-white, and has been the produce selected from those whose feathers were nearest to the mealy-

white, slightly tinged and shaded with black. These have been bred in and in, and established the mealy-grey; and from those of darker varieties have nearly all our greys originated. The hen's colour will, in general, prevail wonderfully more than the cock's.

"The tame birchin black-breasted duck has been originally bred from the black-breasted red, the yellow-birchin, and the grey duck-wing hens. The feather of the birchin duck is a grey hackle, tinged with black above and black beneath, the ground yellow, with a general shade of the dark birchin through, and clear black-breasted, with yellow legs and beak. No cocks exhibit a longer period of unfaded health than the true black-breasted birchin ducks, and their reputation stands high in the opinion of sportsmen.

"The piles have originated from a variety of crosses, which have constituted the many shades we find in this numerous class. There is a strain in these cocks that eminently distinguishes them."

The sorts which Sketchley mentions as inferior, most probably from injudicious crossing, are, the pheasant-breasted red, the large spot-breasted red, the blotch-breasted red, the turkey-breasted grey, the large marble-breasted grey, the large spot-breasted grey, the shady-breasted birchin duck, the streaky-breasted birchin duck, and the marble-breasted birchin duck.

Among the list of imperfections, he enumerates "flat-sided and then generally deep-keeled, short-legged, thin thighs, crooked or indented breast, short thin neck, imperfect eye, duck and short-footed, and unhealthful."

3.—THE DORKING FOWL.

(*Gallus pentadactylus*, Temminck ; *Le Coq et la Poule à cinq doigts*, Buffon ; *Das Funfzehiger Huhn*, Bechstein.)

THESE fowls, which form the principal supply for the London market, are distinguished by having five toes instead of four on each foot. Their flesh is extremely white, succulent, and delicate ; and they have the advantage of feeding rapidly, and growing to a very large size, when properly managed. Capons and poulardes, though by no means so common in England as in France, are sometimes made of these fowls ; which, when castrated, grow to an enormous size, a well-fed capon having been known to weigh fifteen pounds. The feathers of the Dorking-fowls are almost always white, and their legs are short and remarkably smooth.

4.—THE MALAY, OR CHITTAGONG FOWL.

THESE fowls have remarkably long legs, and large bones. Their flesh is, however, exceedingly well flavoured, when they have been properly fattened ; and their eggs, which are very large, are so rich, that two of them are equal to three of those of ordinary fowls. The colour of the feathers is black, or very dark-brown, streaked with yellow, and the legs are very large and coarse. The fowls are so tall, that they can reach to a great height as they stand on the ground ; and, as they have great power, and remarkably strong beaks, they are rather formidable antagonists when offended. The cock has also a very loud and harsh crow. They are

said to be bad sitters ; but this is not always the case, as in some places in Yorkshire no other kinds of fowl have been kept for many years. It is said that a cross-breed between the Malay and the common fowl produces a breed very superior to either of its progenitors.

5.—THE PADUAN, OR JAGO FOWL.

(*Gallus giganteus*, a. *Patavinus*, Temminck ; *Le Coq de Caux et les Poules de Sanseverre*, Brisson ; *Das Paduanische Huhn*, Bechstein ; *The Duke of Leeds*, or *Shack-back fowl*, of English writers.)

THE wild species termed the Jago fowl by Marsden (see *fig. 2*), is a native of Java and Sumatra, and is supposed by Temminck to be the original of this fine breed, though little is known of the wild sort further than that it is double the size of the Bankiva, or dunghill fowl. Marsden says, he has seen in the East a cock of this species tall enough to pick crumbs from a dining-table. They are said to weigh from eight to ten pounds. The comb of both the cock and hen is large, frequently double, of the form of a crown, with a tufted crest of feathers, largest in the hen ; the voice is stronger and harsher than that of other fowls ; but the most singular peculiarity is, that they do not come into full feather till about half-grown.

The Cochín China fowls, in possession of Her Majesty, are said to be a variety of the Jago fowls ; and the shack-back, shack-bag, or Duke of Leeds's breed, is supposed to have been a hybrid between the Jago and Dorking fowls. This fowl, which was formerly in very

high repute, is said to have been as large and as finely flavoured as a turkey ; and though it is now rarely met with, it is still to be found in some poultry yards in Berkshire. There are numerous hybrids and varieties of the Jago fowl found under different names in poultry-yards, but all of them lay fine large eggs, and are highly esteemed for the fine flavour of their flesh. One of the most interesting of these varieties is what is called the Spanish fowl (see *fig. 3*), the body and tail feathers of which are of a rich black, with occasionally a little white on the breast. The cock of this variety is a most majestic bird ; its deportment is grave and stately, and its eyes are encircled with a ring of brown feathers, from which rises a black tuft that covers the ears. There are other similar feathers behind the comb, and beneath the wattles. The legs and feet are of lead colour, except the sole of the foot, which is yellowish. The every-day, or ever-laying fowls, are the same as the Hamburgh, or Dutch fowls ; as they have acquired their latter names, because they were first sent to England from Holland. They are, however, evidently only a variety, or hybrid, of the Jago fowl, with the nourishment that was required in that species, and in some of its varieties, to form a tuft of feathers, expended in an enormous comb and wattles. These fowls are very large, and their feathers are blackish, with an iridescent green.

The wattles and combs, even of the hens, are unusually large, and the caps under the ears are very large, and of a bluish white.

6.—THE CRESTED FOWL.

(*Gallus Bankiva*, *β. cristatus*, Temminck; *Le Coq huppé*, Buffon; *Das Hauben Huhn*, Bechstein.)

THIS variety is characterised by a densely-tufted crest, while the comb is small; and by being variegated with five colours, but it agrees in other respects with the common dunghill fowl. Dr. Bechstein mentions the following varieties: viz. the white fowl with a black crest; the black fowl with a white crest (which is the Poland fowl of some English writers); and the white fowl with a large beard. Of these, the Poland or Polish fowl is the best known; and it appears probable that it is a hybrid between the crested and the Spanish fowls. It is, however, quite unknown in Poland, and takes its name from some resemblance having been fancied between its tufted crest, and the square-spreading crown of the feathered caps worn by the Polish soldiers. These fowls are exceedingly handsome, and remarkably good for the table. The hens are excellent layers, and produce very large, finely flavoured eggs, but they are bad sitters.

The breed of crested fowls is much esteemed by the curious, and is bred with great care. Those who are desirous of propagating any singular varieties, separate and confine the individuals, and do not suffer them to mingle with such as have the colours different. The varieties are more esteemed in proportion as the colours are more rare, or as the tuft contrasts with the rest of the plumage; but though the differences of plumage

are thus preserved pretty constant, they seem to owe their origin to the same breed, and cannot be reproduced pure without careful superintendence. These cocks are much esteemed in Egypt, in consequence of the excellence of their flesh, and are so common, that they are sold at the rate of twopence or threepence a piece. They are equally abundant at the Cape of Good Hope, where their legs are feathered. Some travellers assert that the Mexican poultry are crested, and that what are called Poland fowls are natives of either Mexico or South America; but these, as well as all the rest on the continent of America, have been introduced from the ancient continent.

7.—THE BANTAM FOWL.

(*Gallus Bankiva*, γ. *pusillus*, Temminck; *Gallus Banticus*, Brisson; *Le Coq de Bantam*, Buffon; *Das Bantam Huhn*, Bechstein.)

THIS is a small variety, with short legs, most frequently feathered to the toes, so as sometimes to obstruct walking; but some bantam fanciers, with Sir John Sebright at their head, prefer those which have clean bright legs, without any vestige of feathers.

The full-bred bantam cock (see *fig. 4*) should have a rose comb, a well-feathered tail, full hackles, a proud, lively carriage, and ought not to weigh more than a pound. The nankeen-coloured and the black are the greatest favourites. If of the latter colour, the bird should have no feathers of any other sort in his plumage. The nankeen bird should have his feathers edged with

black, his wings barred with purple, his tail-feathers black, his hackles slightly studded with purple, and his



FIG. 4.—THE BANTAM COCK.

breast black, with white edges to the feathers. The hens should be small, clean-legged, and match in plumage with the cock.

8.—THE TURKISH FOWL.

(*Gallus Turcicus*, Brisson ; *Le Coq de Turquie*, Buffon ; *Das Turkische Huhn*, Bechstein.)

THIS is generally considered to be a variety of the bantam fowl by Temminck and other writers, and distinguished chiefly by the variety and beauty of its colours.

Aldrovand describes the Turkish cock as having the whole body whitish, except the wing-feathers and belly, which are black ; the tail black, tinged with iridescent green, and some of the feathers green on the one side, and black on the other ; the body is streaked, partly with golden, and partly with silvery streaks, which add

wonderfully to its beauty ; the legs and feet are bluish. The Turkish hen is white, spotted here and there with black ; the feet somewhat blue ; the wattles are smaller than those of the cock ; she is in every other respect like the cock, except that her neck is yellowish, and her tail all of one colour. He describes also another variety of the Turkish hen with feet entirely blue ; the body spotted with white and black ; the neck ashy-yellow ; and, behind the comb, a crest of white feathers.

9.—THE DWARF FOWL, OR CREEPER.

(*Gallus Bankiva*, *δ. pumilio*, Temminck ; *Le Coq Nain*, Buffon ; *L'Acaho*, ou *Coq de Madagascar*, Sonnini ; *Le Coq de Java*, Bonaterre ; *Das Zwerghuhn*, Bechstein.)

THIS variety, which is not larger than a pigeon, differs from the bantam, chiefly in size and in the shortness of its legs. The Acaho is described as very small, with a circle of feathers about the legs, a thick tail, which it carries straight, and the ends of the wings black. Other varieties, said to come from Cambodia and to be now found in the Philippine Isles, have the legs so short as to drag the wings on the ground.

In addition to these, Buffon mentions some fowls in Brittany, which are always obliged to leap, from their legs being so short. They are the size of a dunghill fowl, and kept as being very fruitful. The hens will hatch thirty eggs at a time. Some think these dwarf fowls are the Hadrian breed mentioned by Pliny. Aldrovand, two hundred years ago, describes the dwarf hen as all

black, except the quill-feathers of the wings, which are white at the ends, with some white crescent-like spots on the neck, and a yellow spot around the eye. The head is furnished with a crest of feathers; the comb small and dark-coloured; the feet yellowish; the claws equal, and very white. He does not mention the cock.

10.—THE RUMKIN.

(*Gallus ecaudatus*, Temminck; *Coq Waliki-kili*, Temminck; *Le Coq sans croupion*, Buffon; *Das Kluthuhn*, Bechstein; *Rumpless*, or *Persian Cock*, Latham.)

THIS is now considered to be a distinct species, rather than a variety, and to have been derived from wild fowls still found in Ceylon. It is distinguished by the want of a tail; by the comb not being in the wild birds indented, and by the wattles being blood-coloured rather than scarlet; the feathers are all of a dusky orange in the wild birds, but finely variegated in the tame ones. As these fowls were commonly domesticated in Virginia, Buffon erroneously supposed them to be indigenous to America. They are common in Poland, and in some parts of Germany. Although the wild species has no indentations in the comb, this is not the case with the tame ones, which have often a large double-indented comb. Aldrovand describes the cock as black, interspersed with yellow streaks, and the chief wing-feathers white, the breast white, the feet ash-grey. The hen has a smaller comb than the cock, and is of a rusty colour except three black feathers in each wing.

11.—THE FRIZZLED FOWL.

(*Gallus crispus*, Temminck ; *Le Coq à plumes frisés*, Buffon ; *Das Strupp Huhn*, Bechstein.)

THIS is commonly named the Friesland fowl, from confounding the term “frizzled” with “Friesland.” It is a native of Java, Japan, and other parts of Eastern Asia. It is distinguished by having all the feathers turned and frizzled, being smaller than our common species, more wild, and less suitable for domestic purposes. The chickens are very sensitive to cold, and especially to wet, and are seldom reared but for curiosity. Those which partake most of the original breed have white plumage and smooth feet. The flesh is firm and delicate.

12.—THE SILKY FOWL.

(*Gallus lanatus*, Temminck ; *Gallus japonicus*, Brisson ; *Le Coq et la Poule à-duvet*, Buffon ; *Das Wollhuhn*, Bechstein.)

THIS also is made a distinct species by modern writers. It has the whole body covered with feathers, the webs of which are so disunited, as to appear like hairs or glossy silk ; the general colour is white, and the legs covered wholly on the outside, quite to the toes.

As in other varieties, individuals of this sort differ in respect to colour : some are pure white, others dingy brown, but all of them with dark-coloured legs, on which for the most part are thick stout short spurs, though some are totally without ; nor are the legs always feathered.

Both this and the negro cock have the black outer skin, and have grown into disrepute on account of the facility with which they bastardize our common poultry, so as to render them unseemly both in bones and wattles. They inhabit Japan, where they are valued, and also China, and are there reckoned scarce. The people of Canton carry them about in cages for sale to the Europeans.

13.—THE NEGRO FOWL.

(*Gallus Morio*, Temminck; *Le Coq de Mosambique*, Buffon; *Das Morenhuner*, Bechstein; *the Blackamoor Pullet*, Freyer.)

THIS is a native of Africa, distinguished by the comb, wattles, skin, and bones, being black, as are also the feathers, though the flesh is white and good. These which have been brought to Europe are only kept from curiosity.

14.—THE RUSSIAN, OR SIBERIAN FOWL.

THIS breed seems to differ chiefly from others in having considerable tufts of brown or dark loose feathers springing from each jaw, and others longer or fuller, from the lower mandible, like a Jew's beard. In the hen there is an upright tuft, spreading from the back of the head, of the same silky texture. Independently of these, the cock has the usual comb and wattles, and the hen a small comb likewise. This sort is said to have come from Moscow, and varies in colour, one variety being white, with the ends of the feathers glossy blue or black, giving it a spotted appearance, and the legs being

covered with fibrous, or downy feathers. Another has the plumage of the game-fowl, a fine tawny orange, spotted with black. This sort is much esteemed in Scotland for prolific laying.

15.—THE BARBARY FOWL.

THIS African variety is generally of a pale or dun colour, spotted about the neck sparingly with black, and the feathers at that part very full; on the crown is a large, full tuft of feathers, the same in colour with the body.

THE COLOURS OF FOWLS.

THE varieties in the sizes, forms and colours of fowls, are sufficiently striking to attract the notice of the most indifferent observer; while, to those who can find subject of reflection in every production of nature, they may be made an ample source of interesting remark, as well as of amusing experiment. “If people,” says M. Réaumur, “are affected with the kind of pleasure so transitory to the most enthusiastic florists, who procure it but for a few days by a world of care and toil continued through a whole year—if they are affected by the variety and fine combination of colours in their favourite flowers, the poultry-yard, when well managed, may be made to offer them endless pleasures of the same description.”

The greater number of cocks, even those of the com-

monest breeds, when exposed to the play of the sun's rays, exhibit the brightest colours, in extraordinary beauty, and varied mixture; and even the hens, if the breeds have been select, are often no less worthy of admiration. Some, for instance, have spots distributed with great regularity, and so brightly white as to look silvery; others are termed golden, because they are spotted or speckled with a fine golden orange colour; while the more common colours are varied in a manner almost endless; and, upon the whole, domestic fowls offer a multitude of colours, the several shades of which would be found with difficulty, if they were sought for among the birds of the woods or the waters.

Another peculiarity in the colours of fowls is, that they frequently change in a very surprising manner, from the time when the chicks cast their down to the annual moult of the full-grown fowls. It is, no doubt, the regular process, at least after the second and third moults, for the colours to continue much the same. I have, at present, a hen of the Spanish breed, which has been of a uniform black for two successive moults, but has now her neck, wings, and tail feathers tipped with pure white. I have another which was all over of a silver grey, but has now her head and neck coal black, with a ring of fine white at the base of the neck, while the rest of the body is finely speckled with black and snow white. It is remarkable also, that this change took place in a few weeks, without any obvious moult, so as to cause her to appear anywhere bare of feathers.

We are told by M. Réaumur, that one of his hens which his poultry-woman distinguished from the rest by a crooked claw, when her coat began to be taken notice of, had feathers of a ruddy colour mixed with the brown so common among dunghill fowls. A year afterwards, this hen was observed to become almost black, with here and there some large white spots. After the second moulting, black was the predominant colour on every part of the body ; but strange to tell, upon the succeeding moult, white was the predominant colour, and only a few black patches about the size of a crown-piece could be observed. Upon the succeeding moult, all the black spots disappeared, and the hen became uniformly of a pure white like that of a swan. As she was at this time old for a fowl, that is, not less than ten years, it might be thought that old age, which whitens the human hair, likewise whitens the feathers of certain birds ; but, in that case, M. Réaumur says, the transition from the ruddy to the white ought not to have been made, as it really was, through the black ; and he was of opinion, as the hen was still vigorous and healthy, that she might again change her colour, if she lived, to brown or black.

M. Réaumur makes some interesting remarks on a cock which he observed with more attention than the hen, so as to establish proofs, that the white colours of the feathers were not, at least in that instance, caused by age. The owner of the cock was struck, the first time he moulted, with the singular change in his colour ; and for five successive moults, there was

always a considerable change of colour. In his first year, he had some of the ruddy brown, mixed with white, so common in dunghill cocks ; in the second, he was all over ruddy brown, or rather red, without any white ; in the third, he became uniformly black ; in the fourth, uniformly white ; and in the fifth, when he was presented by the prior of Bury to M. Réaumur as a curiosity, he had white feathers mixed with a good deal of ruddy colour and brown, bordering upon chestnut, his neck, back, wings, and belly, being ruddy ; and even where there were white feathers, they were mingled with ruddy ones. During the summer vacation at Paris, M. Réaumur was two months without seeing the cock ; but in this period he became so changed as not to be recognisable, his feathers having become all over of the finest white. The following year he had partly white feathers, but the greater portion was ruddy, or rather of a fair red. Here, then, was a transition from white to a light brown, indicating that the whiteness of his feathers was not owing to the number of his years.

It has been remarked by several scientific observers, that hen birds of various species, but more particularly hen pheasants, put on, under certain circumstances, the plumage of the male. The celebrated physiologist, Mr. John Hunter, in his work on the " Animal Economy," is of opinion that " this change of character takes place at an advanced age of the animal's life, and does not grow up with it from the beginning." Mr. Butler expresses a similar opinion still more strongly, namely,

that "all hen pheasants, as well as common fowls, would assume the plumage of the cock, to a certain degree, if they were kept to a certain age."—(*Mem. Werner. Soc.* vol. iii.) Though this, however, to some extent may be true, the reasons, or rather the accompanying circumstances and changes of constitution, were first pointed out, it is believed, by Mr. Yarrell, who seems to have determined that the change of colour depends on disease, or removal of the ovarium of the fowl. Among seven hen pheasants, whose plumage more or less resembled that of the male, he found the organ in question diseased, with some variation as to extent, and the progress of change observable in the plumage bore a corresponding analogy. At the commencement of this internal disease, the plumage does not seem to be affected, for "hen pheasants in confinement, and females of the common fowl in the poultry-yard, had been known to have ceased producing eggs two years before any change was observed in their plumage." When barn-door hens are castrated, or, rather, have part of the egg-tube cut out for the purpose of fattening, the plumage undergoes a similar alteration, so as to render it difficult to distinguish the birds from capons.

POULTRY YARD AND SHEDS.

It is well known that too much cold renders fowls torpid, retards and diminishes their laying; that too much heat enfeebles them; that the want of good water brings on many disorders; that too much moisture induces rheumatic swellings; and that an infected atmosphere renders them sickly, and less prolific, injures their flesh, and makes them difficult to rear. From these circumstances may be deduced the principles upon which all poultry-yards should be regulated.

The minor details, however, differ considerably in different countries; and particularly the French and English breeders are quite opposed to each other on several points. As a proof of this, and as the French are celebrated for their management of poultry, we shall first give from one of their celebrated writers, M. Parmentier, some account of their manner of conducting such establishments, before coming to those at home.

FRENCH POULTRY-YARDS.

IN order to unite all the advantages desirable in a poultry-yard, it should be neither too cold during winter, nor too hot during summer; and, if possible, it should be rendered so attractive to the hens, as to pre-

vent their laying in any chance place away from it. The extent of the place should be proportional to the number of fowls kept, but it will be better too small than too large, particularly in winter, for the mutual imparting of animal heat. There is no fear of engendering infectious diseases by too much crowding ; and it is found, in fact, that when fowls are crowded into a small space, their desire for laying continues even in winter.

The best situation for a poultry-house is facing the east, neither too far from, nor too near to, the farmhouse. The form may be a parallelogram, of twelve feet long by ten broad, and as many in height. The floor must be raised about a foot above the level of the ground, the walls thick, very rough-cast, white-washed without and within, having no chinks, crevices, or cavities, to harbour polecats, weasels, rats, mice, or even insects ; and the roof ought to project considerably in order to ward off rain, moisture being a most destructive enemy to poultry. The door ought to be small, with an opening at top for the fowls to go in and out, descending therefrom by a ladder, to and from the roosting-place, which should be on a level with it, having one circular window towards the east, and another opposite towards the west, both of wire-work, with a storm-shutter. These windows are chiefly for ventilation, and must be kept always open in summer, and as carefully shut in winter, except on fine days, during sunshine.

In the interior angles must be placed, upon ledges or other supports, at ten or twelve inches distance,

roosting-perches of a square form, for fowls cannot bend their toes so as to grasp firmly a smooth round perch.

The intermediate spaces are appropriated for laying-nests, each covered with two boards meeting together like a roof, to protect the laying hens from the dung of those on the perches, and to prevent them from being disturbed. These nests are osier baskets, firmly fixed against the walls, well furnished with cut rye straw, often renewed, and disposed so that the fowls may not break the eggs on going in or coming out. A watering-place is indispensable, and the water ought to be fresh.

In order to render the poultry-house healthy, it will not be requisite to fumigate it by burning aromatic plants, incense, or benzoin, for which old agricultural writers have given so many receipts, as these in general injure the fowls, while they have no disinfecting influence. Fire, air, and water alone are quite sufficient for ventilation and cleanliness. It will be sufficient, therefore, after the fowls have left their roosts, to open the door and the windows of the poultry-house, and, from time to time, to burn a small bundle of straw, for the purpose of causing a circulation of fresh air and to destroy insects. It will also be necessary to scrub and wash with cold, or rather hot water, and a little vinegar, the nest-baskets, roosting perches, and feeding troughs.

The surface of the yard, well paved with stones, bricks, or tiles, ought to be frequently swept, washed, and it may be covered with a bed of gravel, or with straw cut small.

The same house ought to be kept exclusively for the common fowls, other roosting places being provided for the other sorts; for though these will not be very dissociable with others through the day, they do not like to sleep under the same roof with species different from themselves. In particular, they will not suffer capons, even of their own family, to occupy the same roosting-perch with themselves. The hens not only show them indifference, but decided aversion.

It is important to have in poultry-houses several small warm hatching and nursing wards for hatching the eggs, and sheltering the newly-hatched chickens. In the ward appropriated to the newly-hatched chickens, there ought to be separate cages or coops, where each mother remains eight days with her family, after which she is removed into an enclosure to finish the rearing of them, till they can without danger be trusted by themselves.

Accessories of the French Poultry-House.

1.—A small trench filled with dry sand and ashes, in which the fowls may roll to free themselves from vermin.

2.—Another small trench containing horse-dung, to be frequently renewed, and in which they amuse themselves, particularly in winter, by scraping for corn and worms.

3.—Two squares of turf, on which they may pasture and divert themselves.

4.—A thick bushy hedge, or what are better, trees, to furnish shelter from the heat of the sun, and screen them from the view of the hovering kite. The best sorts of trees are the mulberry and the cherry, as they are very fond of the fruit.

5.—A shed or coping, under which they may take shelter from rain.

6.—Stone or wooden cisterns or troughs, with pure water, in order to prevent them seeking by chance what is bad or corrupted.

7.—The yard, in fine, ought to be spacious, and kept as neat as possible.

ENGLISH POULTRY-HOUSES.

It has already been stated that the French poultry breeders think it advisable to keep their fowls confined in as small a space as practicable, in order that the warmth may induce them to lay; in England, on the contrary, a free circulation of air, and abundant space to take exercise in, are reckoned absolutely essential for poultry. Both modes are, to a certain extent, right; for warmth, and a close warm roosting place, will certainly produce most eggs; while air and exercise are necessary to rear fowls of a superior description for the table.

Where poultry are kept on a large scale, a paddock, varying from half an acre to an acre in extent, is set apart for their use, inclosed either by a wall, or by a fence of paling; but not by a hedge, as the fowls will

get through the latter kind of fence, and will, besides, be very troublesome in laying their eggs in the hedge.

The paddock should be well drained ; and if it has a stream of running water through it, or a pond in the middle, or at one end, it will be best. If it has not these conveniences, it should have a pump, with troughs for the fowls to drink from ; and these troughs should be cleaned out every day. Part of the yard should be flagged for feeding the fowls on ; part covered with sand or fine gravel for them to wallow in ; part laid with turf, that the fowls may find insects and earth-worms, and eat grass when they feel inclined ; and part covered with bricklayer's rubbish, dry mortar, and broken oyster-shells, or other similar materials, rammed down, so that the fowls may amuse themselves with pecking and scratching the ground, without being able to take very much of the calcareous matters from it at once. Where convenient, the feeding and wallowing-places should be roofed over ; but the rest of the ground should be exposed to the open air. It must be observed that, when fowls are kept in small confined places, they should always be supplied with some kind of calcareous matter ; as, unless they are, the hens will first lay eggs without shells, and after a time, will cease to produce any eggs at all. In towns it is, therefore, customary with the keepers of poultry for profit, to mix broken egg-shells with their food, and to give them brick partly covered with mortar, from some old building, to peck at.

The poultry-houses may be built of either brick, or

lath and plaster ; or, as in some places, the walls may be of boards, but these generally make the houses too cold. An economical poultry-house may be made of wooden posts and rails, with the spaces between stuffed with faggots ; but brick-walls are generally preferred to all others, where the expense is not objected to. The roof should always be thatched, on account of the warmth ; and the floor may be either laid with bricks or flag-stones, or it may be covered with a mixture of lime and clay, rammed hard. Asphalt and slate are also recommended for the floors of poultry-houses. Whatever the material may be, the floor of a poultry-house should always be a little higher than the level of the yard, to afford facilities for keeping it clean. The floor should be swept every day, and washed once a week ; and the walls of the house should be white-washed inside every spring, and every crevice carefully stopped. The doors are made of wood, and should be strong, and furnished with a lock, to prevent any danger of the poultry being stolen during the night ; and there is generally a square hole cut in the door, either at the top or bottom, for the poultry to go to roost. A hole at the top of the door is generally preferred, as it is inaccessible to vermin ; and there should be a ladder on the outside for the fowls to ascend. This ladder is composed only of a slanting board, with strips of wood nailed across ; and when the hole in the door is at the bottom, a similar ladder is placed inside the house.

All fowls like to roost high ; and they should, therefore, have some rails fixed for them near the roof, so

arranged that the fowls on the lower rails may not be exposed to the droppings from those above. The rails are frequently only branches, or the trunks of young trees ; but if made of timber, they should be nearly square, with only the corners rounded off, as the feet of fowls are not formed for clasping smooth round poles ; and there may be boxes or baskets against the walls for the fowls to lay in.

These rules must, of course, be varied considerably according to circumstances ; but fowl-houses, if the situation will admit, should always be built on a good dry airy spot, not exposed too much to the wind ; and whatever the shape of the buildings may be, they all ought to be so constructed as to be easily cleansed, for cleanliness is a great point to be attended to in the management of poultry, disease being, in most instances, generated by filth. To prevent vermin from making inroads, the buildings, if of wood, should be put closely together, and have a good coat of pitch on the outside, and the walls within should be frequently white-washed. When the fowls are kept within a yard, grass or clover should be planted here and there, and there should be a few heaps of gravel, sand, or ashes, so placed, that the fowls may roll themselves therein, and cleanse their feathers from vermin. Carbonate of lime or chalk being indispensable for the perfect formation of eggs, the poultry should always have free access to it. It is reckoned best to have various roosting houses constructed for the different kinds of poultry, and a separate nest provided for each ; as, without this pre-

caution, the same nest will frequently have three or four visitors. The best kind of nests are said to be those made of wood, wicker-baskets being calculated to let in the cold air. The floors of the roost-houses should be kept sanded, and in fine weather the doors should be thrown open to give access to fresh air.

The most remarkable amateur poultry establishments in Great Britain are those of Her Majesty at Windsor; of Lord Penrhyn, at Winnington, in Cheshire; of the Earl of Derby, at Knowsley; of the Earl of Chesterfield, at Bretby Park, in Derbyshire; of Earl Spencer, at Althorp; of Mrs. Marryat, at Wimbledon; and of Mrs. Lawrénce, at Ealing Park.

HER MAJESTY'S POULTRY-HOUSES AT WINDSOR.

THIS establishment consists of several extensive yards and small fields; a large building containing the laying, roosting, feeding, and sitting houses; a hospital for sick fowls; and courts warmed by flues, to afford exercise for the more tender kinds during severe weather. The principal house is a very elegant building, with a central pavilion for feeding and inspecting the fowls, over which is a pigeon-house, something in the style of the Italian bell-towers; and on each side are numerous compartments for laying, roosting, and sitting houses. In front of the house is a large court, divided into compartments, and protected by a wire fence; and beyond it the ground slopes down towards the park. The space enclosed by the wire fences, which is consider-

able, is laid out in grass plots, bordered by gravel walks, for the fowls to exercise in.

It is well known that fowls, when left to choose a nest for themselves, generally fix upon a hedge, where the hen buries herself from observation under the branches of the hedge plants, and among the grass. This peculiarity has been taken advantage of at Windsor; and the laying nests for Her Majesty's hens are composed of heath or heather, and branches of hawthorn are trained over and round them as shown in *figs. 5 to 7*. *Fig. 5* shows an empty nest with its

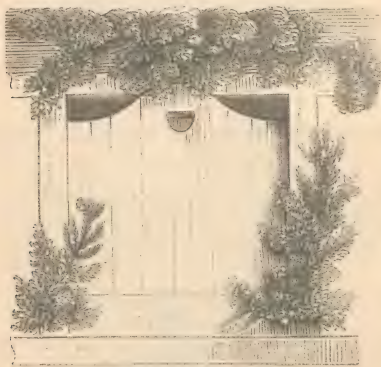


Fig. 5.—Nest with sliding door closed.

sliding door closed; *fig. 6* a similar nest with the door removed; and *fig. 7* a nest with the hen sitting. The dove-cot is fitted up most elegantly and is lined with looking-glass, to the great delight of the pigeons, who are said to

stand for hours bowing and cooing to their images as reflected in the glass. A great variety of fowls are

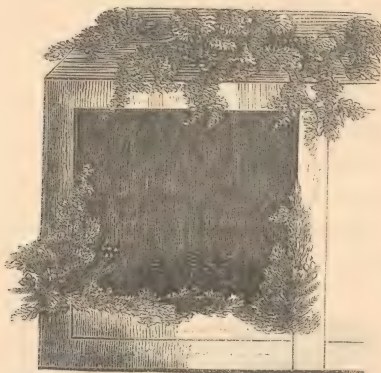


Fig. 6.—Nest with the door removed.

kept at this establishment, but the most remarkable are the Cochin China, already alluded to, which stand so

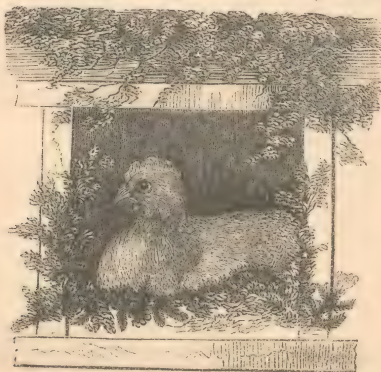


Fig. 7.—Nest with hen sitting.

high as to peck from a common dining-table, and which in form resemble the Malay fowls; and the beautiful little Java bantams, which are perfectly white, and which produce abundance of eggs, remarkable for their high flavour and richness. The cocks of these bantams are, however, said to be very destructive to eggs, which they break in order to eat their shells; but this disagreeable propensity would probably be cured by allowing them plenty of powdered oyster shells, lime, chalk, or some other calcareous substance.

LORD PENRHYN'S POULTRY-HOUSE.

ONE of the finest poultry-houses, perhaps, that ever has been built, is at Lord Penrhyn's, at Winnington, in Cheshire. It consists of a handsome regular front, extending about 140 feet, at each extremity of which is a neat pavilion, with a large arched window. These pavilions are united to the centre of the design by a colonnade of small cast-iron pillars painted white, which support a cornice and a slate roof, covering a paved walk, and a variety of different conveniences for the poultry, for keeping eggs, corn, and the like. The doors into these are all of lattice work, also painted white, and the framing green. In the middle of the front are four handsome stone columns, and four pilasters supporting likewise a cornice and a slate roof, under which and between the columns is a beautiful mosaic iron gate; on one side of this gate is an elegant little parlour, beautifully papered and furnished; and at the other end of the colonnade a very neat

kitchen, so excessively clean, and in such high order, that it is delightful to view it. This front is the diameter or chord of a large semicircular court behind, round which there is also a colonnade, and a great variety of conveniences for the poultry. The court is neatly paved, and has a circular pond and pump in the middle of it. The whole fronts a rich little field or paddock, called the poultry-paddock, in which the poultry have liberty to walk about between meals. At one o'clock a bell rings, and the beautiful gate in the centre is opened. The poultry being then mostly walking in the paddock, and knowing by the sound of the bell that their repast is ready for them, fly and run from all corners, and rush in at the gate, every one striving which can get the first in the scramble. There are about 600 poultry, of different kinds, in the place ; and although so large a number, the semi-circular court is kept so very neat and clean, that not a speck of dung is to be seen.

This poultry-house is built of brick, excepting the pillars and cornices, and the lintels and jambs of the doors and windows ; but the bricks are not seen, being all covered with a remarkably fine kind of slate from his lordship's estate in Wales. These slates are closely jointed and fastened with screw-nails, on small spars fixed to the brick ; they are afterwards painted, and fine white sand thrown on while the paint is wet, which gives the whole the appearance of the most beautiful freestone.

MR. WAKEFIELD'S POULTRY-HOUSES NEAR LIVERPOOL.

SOME people are of opinion, that each sort of poultry should be kept by itself. This, however, is not absolutely necessary, for all sorts may be kept together, provided they have a place sufficiently large to accommodate them conveniently, and proper divisions and nests for each kind to retire to separately, which they will naturally do of themselves.

This mode has been practised with great success by Mr. Wakefield, near Liverpool, who kept a large stock of turkeys, geese, hens, and ducks, all in the same place ; and although young turkeys are in general considered so difficult to bring up, he reared great numbers of them every season, with very little trouble. For this purpose, he had nearly an acre of ground, inclosed with a fence only six or seven feet high, formed of young fir or other trees, split and put close together, fastened by a rail near the top, and another near the bottom. The upper end of each stake was formed into a sharp point ; and the whole formed such an efficient fence, that the poultry never attempted to fly over it, although it was so low. Within this fence were places done up slightly, but well secured from wet, for each sort of poultry, and also a pond or stream of water running through it. Mr. Wakefield's poultry were fed almost entirely with potatoes boiled by steam, and thrived astonishingly well. The quantity of dung that is made in this poultry place is also an object worth attention ; and when it is cleaned

out, a thin paring of the surface is at the same time taken off, which makes a valuable compost, for the purpose of manure.

SCOTCH POULTRY-HOUSES.

THE lower classes of Scotch who keep poultry, have abundance of eggs, as their fowls are generally kept in their dwelling-houses, and frequently roost in the upper part of the box beds of the family, where they have plenty of warmth. The want of cleanliness, however, attendant on this arrangement has occasioned many plans to be proposed, and some large establishments have been formed in different parts of the country, the details of one of which are given below.

MR. ENGLAND'S POULTRY-HOUSE NEAR ABERDEEN.

IN a paper published in the *Transactions of the Highland Society of Scotland* for 1833, Mr. England, of Aberdeen, gives a plan of a poultry-house, which appears to be very complete of its kind, though he differs from most of the chief authorities in many points of management. The house is divided into separate wards, each ward fitted up to lodge twenty-four hens and one cock, with a yard attached, about fifteen feet long, by ten feet broad. The following is the ground-plan of two such wards, with their yards and houses, copied from the plate which accompanies Mr. England's paper in the *Transactions*.

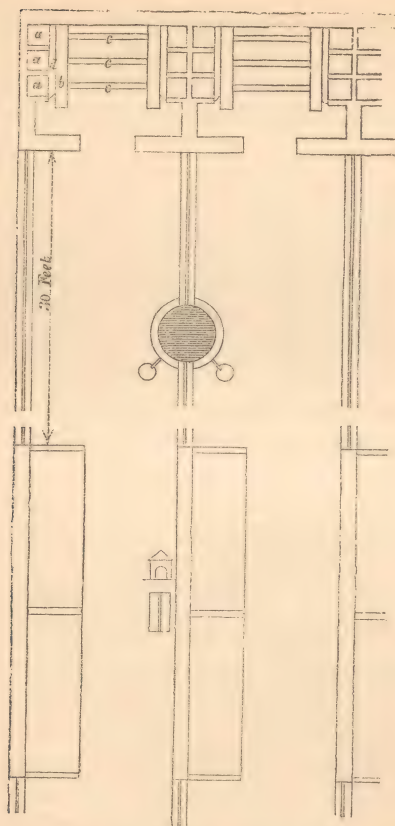


Fig. 8.—Ground plan of two wards, with their houses and yards.

a, a, a, three of the nests out of twenty-four in each house.

b, ladder by which the fowls go up to the nests.

c, c, c, three roosts, holding about twenty-four fowls.

d, platform to allow the fowls to pass in front of the nests.

The manner in which the nests, the roosting-perches, the ladders for the fowls to go up by, and the platforms to allow them to pass in front of the nests, are arranged, will be best understood from the figures below.

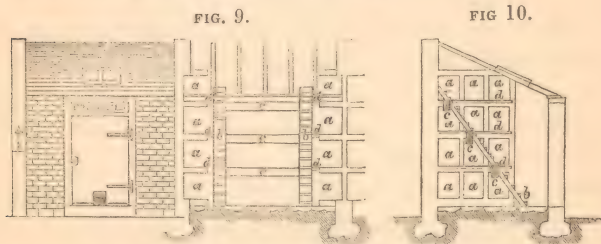


Fig. 9.—Front elevation and longitudinal section of poultry-house.

Fig. 10.—Transverse section of ditto ; *a*, nests ; *b*, ladder ;
c, roosts ; *d*, platform.

Mr. England also provides what he terms a storm-house for the fowls to run to shelter in bad weather ; and a dry bath-house to afford them sand for pulverizing, which are represented in the following figures.



Fig. 11.—Elevation and section of storm-house, and dry bath-house.

CAGES AND COOPS FOR PARTICULAR PURPOSES.

In both large and small establishments, it will often be requisite to separate some of the fowls from the rest.

Ailments and diseases, for instance, are not uncommon, and, as the healthy fowls do not like the diseased ones, they ill-treat and often kill them. Pens, therefore, should be set apart for any that appear drooping, till they get better.

When peculiar breeds also, such as full-bred game cocks, are to be reared, separate pens must be provided, either at some distance from each other, which is the best way, or with divisions to prevent any intrusion, by which improper crossing might be produced, or the fowls be injured by fighting. Places may be made with this view, by preparing a row of cages equal in number to that of the species to be preserved. These cages will be an ornament to the poultry-yard, and will cost but very little, if made of lattice-work, either with hoops or with small laths in the form of a bower, five feet high, about three feet broad, and their length determined by that of the ground at disposal. They should be divided by means of partitions, also of lattice-work, as thickly wrought as the rest, into a number of portions, each whereof forms a cage or pen, the smallest four feet, and the largest six feet and a half, long. The least of these is sufficient to lodge a cock with two or three hens, the largest is for three or four hens and a cock. Each cage should have its door, which should be high enough for a man to enter stooping; and each should be but one part of the habitation of the cock and his hens; it is their day-room as it were, behind which they have a night-room or roosting-chamber. The lower of these night-rooms should lie at the distance of two feet from

the wall to which it is parallel, and the side of the pen nearest to the wall should be only a partition of boards. There is no lattice-work between the partition that constitutes the back part of the pen, and the wall; there remains, therefore, a narrow gallery in that place, divided by partitions into as many parts as is the whole length of the pen, and into portions corresponding: each of these parts is the roosting-place of one cock and his hens. The intention is that they should be warmer there under the pen, and not exposed to the rain; therefore the gallery must be covered, from one end to the other, with a roof, which consists, in its breadth, of a couple of boards so joined as to make a gutter, that conveys the water to one end of the gallery. There is a door of communication from each, under the pen, to the corresponding room behind. The opening of the door should only be adapted to the shape of the biggest fowl, but it must also, on many occasions, receive the head and arm of one man, and even permit a man creeping on his belly to enter into the second room. A plain board, cut square, will close that gap; which is a door that requires no lock, as it moves up and down in two grooves; care is taken every night to let it down, to shut the door, and to open it every morning. It is raised or kept open by a small pack-thread fastened to its upper edge, and having a ring to be hooked on a nail.

It is in the fore-room, which is the larger of the two, that the cock and his hens remain, at least the great part of the day; it is there they find their meat and drink; they breathe there an air which is not stagnant,

and they besides enjoy the influence of the rays of the sun, when care has been taken to place the row of pens in a southern position. At night they are warmer behind than the hens that roost upon trees, and almost as warm as those that lie in a hen-house, provided it be not forgotten to shut the door at night, to guard against vermin and foxes.

THE POULTRY-KEEPER.

It is not sufficient to have the poultry wholesomely and comfortably housed ; they must have an active guardian, to preserve them from all enemies, and put them in a condition of procuring every advantage to the farmer. Though easily scared by the least strange animal, fowls get willingly used to everybody belonging to the farm ; they are not afraid of coming to feed with all the other animals, even in their troughs and mangers ; they would even sit at their master's table, if they were allowed. Faithful to the house that feeds them, and not content with daily enriching it with their eggs, they never stray from it ; so that, on perceiving a fowl, the traveller in search of a habitation is certain that one is at hand : but as they are liable to many accidents, and do not thrive unless regularly fed and kept warm, they require some person to watch over and take care of them.

In extensive farms, therefore, there must always be a person who can be depended on for all the minute and numerous particulars which the management of fowls require ; and this office is usually intrusted to an elderly

woman or a girl. To acquit herself properly of her employ, she must be cleanly, careful, mild, patient, clever, attentive, and vigilant; when all these qualities are combined in her, she is a perfect treasure, and might not be easily replaced.

Her first duty in coming into office is to try to render herself liked by the fowls the management of which is intrusted to her, to maintain peace amongst them, to settle their quarrels, to make herself acquainted with the peculiar disposition of each, to distinguish those that are least shy, by speaking to them in a language which they understand, by feeding them in her hand, and by evincing her affection for them by caressing gestures. How many peevish hens have been condemned to the spit before the proper time, which would have lost their cross disposition and have become sociable, had they in their first stage met with more good-will on the part of their mistress, and a more caressing tone on the part of the keeper! No one, except the keeper whom the fowls know, and the voice and sight of whom rejoices them, must go into the hen-house, for fear of scaring or disturbing the hens busied in laying. The inconvenience would be still greater, were a stranger to go and disturb them when they are sitting, or tending their chickens.

After these first cares, daily attention must be paid to distribute food and drink at regular hours, to shut the fowls up in the evening in the hen-house, to turn them out early in the morning, and to proportion their number to the means of subsistence which exist without

unnecessary expense. It is, moreover, necessary to count them over frequently, to see whether the flock is complete; to attend at their meal-times, to judge of their appetite; to examine whether they are in good condition, whether they do not get too fat or too lean; to follow their steps, to watch their actions, and to use them accordingly, taking advantage of their disposition for laying or sitting. The new progeny, designed for fresh-stocking the poultry-yard, ought never to be admitted to the hen-house but in the evening; but when a cock falling off is to be replaced, the keeper, after having tied the feet of the new comer, must hold him out to the hens, and at each time she must so manage it as to hinder the other cocks from insulting him. At the end of a few days they may have no objection to his becoming their equal, nor the hens to acknowledge him as their sultan.

Another attention of the keeper is to visit regularly the nests where the hens lay, to supply them sufficiently with soft and dry straw, to take up the eggs as fast as they are laid, to carry them into a dry, cool, dark place, to separate those that are to be sold or consumed from those that are intended for sitting, and never to put them under the hen without having examined them by candle-light, to know whether they are fecundated, and not to forget to enter in a book the day the hen is set, in order to know the precise time when the chickens will probably be excluded from the egg, and at this time to give the necessary attendance.

The following directions are by an experienced keeper,

and though they appear to belong to the old school, rather than to the modern one, they are inserted as the result of practice.

“The hen sometimes experiences a difficulty in laying. In this instance, a few grains of salt or garlic put into the vent have been successfully tried. The keeper should, indeed, make use of the latter mode to find out the place where a hen has laid without her knowledge; for as the hen will be in haste to deposit her egg, her pace towards the nest will be quickened; she may then be followed, and her secret is soon found out.

“Although thirst is more imperious than hunger to a sitting hen, it often happens that she remains constantly on her eggs for twice four-and-twenty hours without eating or drinking. When the keeper perceives this obstinacy, he must take her up and force her to eat her victuals, but it is in this instance only; for it is better if she rise up and set herself on her eggs, as it also is to leave exclusively to her the care of turning them.

“But it is especially on the day that the chicks are to be hatched, that it is necessary that the keeper should pay particular attention, either to assist their emission, or to strengthen them when they are come out of the shell; or, in fine, to begin the cares they require during the whole time they live under their mother.

“It is proper that the keeper should also be acquainted with the best processes for fattening fowls; that she should know how to distinguish the food which overheats them from that which cools them; also that which is most profitable and least expensive; that

she should put aside each individual as soon as she perceives its plumage bristled up, and disordered, its wings hanging or dragging; and that she should be thoroughly acquainted with all the symptoms of the several diseases, in order to apply the most efficacious remedies in time. She must also know that when the shells of the eggs are rather soft, it is because the hens are rather inclined to grow too fat. It is then proper to mix up a little chalk in their water, and to put a little brick-dust in their food, the quantity of which should be diminished."

FOOD OF POULTRY.

It is clearly impossible to ascertain the best sorts of food and drink for poultry, without some knowledge of the structure and functions of their ORGANS OF DIGESTION, combined with experience of their management.

The digestion of food is partly a mechanical and partly a chemical process, and in its several stages differs considerably in fowls which feed on grain, from what it is in quadrupeds which feed on grain, such as the horse and the rabbit. In the latter, when fed with oats, many grains are frequently swallowed without being crushed by the teeth ; and the stomachs of those animals not being endowed with the power of digesting solid, uncrushed grain, it is voided whole ; whereas in fowls, the grain is *all* swallowed whole, their bills not being adapted for bruising it like the teeth of the rabbit or the horse, and it is digested in the stomach. This has given rise to the opinion, certainly not well founded, that fowls are obliged to swallow stones and gravel in order to grind their food after it has been swallowed.

It may be convenient to consider the organs of digestion in fowls as consisting of the gullet and crop, the gizzard, the stomach, the liver, and the intestines.

The Gullet and Crop.

Fowls depend more on the eye in distinguishing their food, than on the taste, which is not so keen as in quadrupeds, nor even as in ducks, which often select their food from mud and sludge. The gullet runs down the neck, a little inclined to the right side, bulging out in front of the chest into a pretty large membranous bag or pouch, termed the crop or craw.

The crop of fowls is in some measure analogous to the paunch or first stomach in the ox and sheep. The gullet opens into its upper part, and recommences about the middle of the bag, so that the crop is in some measure out of the course of the regular communication between the upper and lower opening of the gullet. It receives the food when first swallowed, and macerates and partly dissolves it by means of a liquor, separated by the glands or fountains, which are easily observed everywhere on its external surface. The effect of this may be very well observed in pigeons, which are sometimes in danger of being suffocated by the peas they feed upon, swelling to so immense a bulk in their crops that they can neither get them upwards nor downwards. In such cases, a favourite bird might be preserved by the safe operation of opening the crop with a knife, taking out the peas, and sewing up the wound.

The food, after passing the crop, goes through the remaining part of the gullet into a funnel-shaped bulging, smaller than the crop, and similar to the

king's hood, bonnet, or second stomach of the ox and sheep. This funnel-stomach, as it may be termed, is furnished with an immense number of glands, called solvent or gastric glands, placed close to each other, and all hollow, which secrete a digestive fluid, discharged from each through a small opening into the cavity. This fluid serves to dilute and digest the food still more than was effected in the crop.

The Gizzard.

The food having been moistened in the crop, and still more so in the funnel-stomach, next passes into the gizzard or last stomach. This is composed of muscles peculiarly dense and firm in texture, and lined with a thick membrane of the nature of gristle. This lining resembles the scarf-skin of the human body in becoming gradually thicker by pressure and rubbing, for in chicks it is only a thin slight membrane, turning thicker and stronger as they grow older, and hence chicks cannot digest some sorts of food like older fowls. Towards the cavity of the stomach it forms folds and depressions, which on the opposite surfaces are adapted to each other. The cavity of the gizzard is comparatively small and narrow, and its outlet is very near its entrance. Every part of it is calculated for producing very powerful trituration, and appears intended by Providence to compensate for the absence of grinding teeth in the animals. It results from the hard gristly structure of the gizzard, that it is possessed of small sensibility, and hence fowls seldom refuse food even when dying, and

when none of the functions of digestion are going on ; a circumstance which gives the by-standers hopes of recovery, for the fowl will go on feeding till it drops down dead : if examined after death, the gizzard is generally quite full ; whereas other animals would not eat anything in such a case, though they might perhaps drink, water being amongst the last things which the dying desire, and rarely ever loathe.

The Chyle-gut, Liver, and Sweetbread.

The outlet of the gizzard, which is placed, as we have seen, close to its inlet, discharges the digested food in the form of a greyish paste into the first of the intestines, termed the chyle-gut, situated on the right side, hanging down into the belly, and attached at its two ends to the liver. The liver itself prepares bile from the blood brought into it by the veins, and by a canal or duct carries the bile from the gall-bladder into the chyle-gut in a downward direction, (contrary to the structure of other animals,) to be mixed with the digested food. Besides the bile, another fluid is brought into the same part of the chyle-gut by two canals from the sweet-bread or pancreas.

Intestines.

The food next passes on to the small intestines, on the inner surface of which the minute mouths of numerous veins (not lacteals, as in other animals,) open to suck up the aliment prepared in the stomach and chyle-gut, while the refuse is passed on to the vent-gut, to be dis-

charged by the vent. There are two blind guts, (not one, as in other animals,) in which the mixed aliment remains some time in its passage.

The Kidneys and Urine.

Though fowls do not make water like other animals, they are furnished with kidneys for removing any superabundant fluid from the blood. These kidneys lie in the side of the back-bone in a peculiar hollow, and from them a bluish-coloured canal carries the urine, not into a bladder as in other animals, but into the vent-gut, where it mixes and is discharged along with the dung. It is clear from this, that when the fowl is healthy, the dung ought to be rather moist than dry.

EXPERIMENTS ON THE DIGESTION OF FOWLS.

FROM a series of singular and cruel experiments, tried by an Italian named Spallanzani, it has been discovered that the digestive fluid of fowls cannot dissolve their food without the assistance of the grinding action of the gizzard. Before the process of digestion can commence, therefore, the grains must be bruised ; and such as are not bruised before passing into the gizzard are there subject to the action of the two gristly surfaces already described, which seem to produce a rotatory motion upon the food, in consequence of one side of the cavity not corresponding exactly to the other.

From this form of cavity it is evident that no part of the sides are ever intended to be brought into contact ; and that the food is ground by being mixed with hard

bodies, and acted on by the powerful muscles which form the gizzard. The action of the gizzard then is so far mechanical, and the food, as in a mill, is ground to pieces, and then pressed by degrees into the intestines in the form of a pulp ; the four muscles or grinders being the chief operators or millstones. The power of these grinders is so great that ducks, fowls, and pigeons were found to pulverise hollow globules of glass in a very short space, and even solid ones in a few weeks. Some spherules of glass blown by the lamp, and so thick that they would seldom break when thrown on the ground, were generally reduced to small fragments, after remaining three hours in the stomachs of hens or capons ; the fragments were not sharp as when they are broken by the efforts of the hand, but as blunt as if their edges and points had been rubbed off by a grinding-stone. The longer the spherules continued in the stomach, the more minutely were they ground down ; so that in a few hours they were reduced to a mass of particles, not larger than grains of sand.

The rapidity also of this process appears in some measure proportional to the size of the animal. A wood-pigeon generally breaks them less speedily than a chicken, a chicken than a capon, but a goose the soonest of all. The reason is plain, since the larger species have thicker and more powerful stomachs.

Other experiments proved that needles, and even lancets given to a turkey, were broken to pieces and voided, without the stomach of the bird sustaining any injury from them.

THE USE OF SMALL STONES AND GRAVEL, SWALLOWED
BY FOWLS.

REDI, an Italian physician, made several ingenious experiments to discover the causes and effects of the small stones which fowls are well known to swallow, and which have led to many theories among writers. By some they have been considered, like the grass eaten by dogs and cats, rather medicinal than as a common auxiliary to digestion ; while others have supposed them to act as absorbents for any superabundant acid in the stomach ; and others, as stimulants to the obtuse, almost insensible, coats of the gizzard. Some, again, formed the very extravagant idea that the stones in question contributed directly to nutrition, an opinion which is refuted by the experiments of Redi, who, having shut up two capons with nothing but water and little pebbles for food, found that they drank much water, but died, one in twenty, the other in twenty-four days, neither of them having swallowed a single stone. An opinion, little less fanciful, is adopted by those who ascribe to the stones the especial purpose of killing the grains of corn, which, while capable of germinating, would resist the action of the digestive fluid. Others have supposed these pebbles intended to sheathe the gizzard, in order to enable it to digest, or at least to break down into small fragments, the hard, angular substances which may be swallowed ; but the preceding experiments show that the muscular action of the gizzard is equally powerful whether the small stones are

present or absent. To ascertain this point, Spallanzani took wood-pigeons the moment they escaped from the egg, and fed and nursed them himself till they were able to peck. They were then confined in a cage, and supplied at first with vetches, soaked in warm water, and afterwards in a dry and hard state. In a month after they had begun to peck, hard bodies, such as tin tubes, glass globules, and fragments of broken glass, were introduced with the food. Care was taken that each pigeon should swallow only one of these substances. In two days afterwards they were killed. Not one of the stomachs contained a single pebble, and yet the tubes were bruised and flattened, and the spherules and bits of glass blunted and broken. This happened alike to each body, nor did the smallest wound or laceration appear on the coats of the stomach.

With the same view he set under a turkey-hen several eggs, partly her own, and partly those of a common hen. When the chickens were hatched, he took charge of them himself, and employed the same precautions as with the wood-pigeons. They were confined for fifty-five days in separate cages, and their food consisted of various sorts of grain. The last days they had to live he introduced into their gizzards hard indigestible substances. Upon examination, the stomachs appeared to be free from stones, yet the fragments and spherules of glass and the tin tubes were not the less or the more bruised or broken.

Hence, then, we have at length a decision of the famous question concerning the uses of these pebbles,

so long agitated by authors. It appears that they are not at all necessary to the trituration of the firmest food, or the hardest foreign substances, contrary to the opinion of many anatomists and physiologists, as well ancient as modern ; though when the swallowed stones are put in motion by the muscles, they are capable of producing some effects on the contents of the stomach : others, however, deny both these facts, and the conclusions of the stones being swallowed without design, from mere stupidity ; and assert that these stones are so essential to due digestion, that birds grow lean without them, although they may be copiously supplied with food.

In whatever way we consider this contested point, we must conclude that the stones are entirely useless ; for if we compare the strength of the muscles of the jaws of animals who chew their food, with those of birds who do not, we shall say, that the parts are well calculated for the purposes of chewing. Yet we are not from thence to infer, that the teeth in such jaws are useless, even although we have proof that the gums do the business when the teeth are gone. If stones are of use, which we may reasonably conclude they are, birds have an advantage over animals having teeth, so far as stones are always to be found, while the teeth are not renewed. If we constantly find in an organ substances which can only be subservient to the functions of that organ, should we deny them that use, although the part can do its office without them ? The stones assist in grinding down the grain, and, by

separating its parts, allow the digestive fluid to come more readily in contact with it.

Fowls have some power of retaining the small stones taken into the gizzard, or evacuating them when they become polished and less useful, though they cannot, as is said in some books, disgorge them as birds of prey do the pellets of bones and feathers which they cannot digest. In a state of nature, birds swallow only a wholesome portion of these stones, whereas tame birds frequently devour too many. Instances have been known in which the whole cavity of the gizzard was filled with gravel; and in particular, Colonel Montagu mentions part of a brood of ducks, half-grown, which swallowed so great a quantity of gravel, as not only to fill the gizzard, but the crop, and even the gullet: they soon after died.

DIFFERENT SORTS OF FOOD.

POULTRY are fond of all sorts of grain, oats, buckwheat, barley, maize, rye, and millet, and are fed by preference on the sort most readily and cheaply procured. They reject, however, according to Olivier de Serres, the wild tares to which pigeons are so partial. They also eat most sorts of green vegetables, such as lettuce, spinach, and cabbage, both raw and boiled. Most sorts of animal food also, they are very fond of, such as blood, fat, fish, and flesh, both raw and cooked, and they will as readily eat that of their own species as of any other. Insects also, and worms and snails,

they search for with avidity, and some will eat slugs, but of these they are not usually fond, and many fowls will not touch them. Several of the French writers have made experiments upon different sorts of food as given to poultry, which it may prove interesting to detail here.

M. Réaumur's Experiments with Grain.

It is customary to throw to the fowls in a poultry-yard once or twice a day a quantity of grain, generally somewhat less than that which they would consume, if they had an over-abundance. Fowls, however, are more easily satisfied than might be supposed from the greedy voracity which they exhibit when they are fed. M. Réaumur was curious to ascertain the quantity of each sort of grain which a fowl would consume, when abundantly supplied therewith from morning till night, and in the course of his experiments he discovered many interesting particulars, of importance to be known to all those who keep poultry for profit. He found that individual fowls vary very much in the quantity of food which they consume, there being great and little eaters amongst them as well as amongst other animals, most commonly indicated by the size of the body ; for as an elephant will eat much more than a horse, and a large cart-horse more than a small pony, so the quantity of grain consumed in one day by a large fowl, was found to be to the quantity of the same grain consumed by a fowl of ordinary size, in the proportion of four to three, and of a dwarf or bantam as two to one. So that two

bantams might be kept at the same expense as one Spanish fowl. Even amongst fowls of the same size and kind, there are individuals which require more food than others, a circumstance that can only be known by trial. M. Réaumur has seen four common fowls eat as much as eight others, and amongst these small feeders, there were three of the largest size, and three of the remaining five only a trifle smaller. But these are exceptions to the general rule, and such as are not of common occurrence.

For the purpose of accurately ascertaining the quantities of food consumed, M. Réaumur confined fowls separately under basket coops; and others in hutches inclosed with wooden gratings, where they had more convenience, even so much as to lay eggs there in the same way as if they had been at liberty. To the hens in each hutch he put a cock, in order that nothing might be wanting to the completeness of his experiments. In some hutches, he placed as many as seven hens, and in others as few as two. For several days together he gave, both to the fowls in the basket coops, and to those that lived in company in the hutches, the same quantity of grain, measured so as to be more than would fill their crops; and care was taken that the box into which the grain was put for them should never be empty. This box was longer than broad, with a bottom and a piece of board on each side, projecting about five or six inches, so fixed as to prevent the chance of its being upset by the fowls hopping upon it, while the sides were sufficiently high not to allow them

to scrape the grain out of the box,—precautions indispensable to the accuracy of the experiment, as in this way every grain of corn could be accounted for. Gravel was also spread upon the bottom of the hutches and coops, and some was placed in a separate vessel, as being judged indispensable to promote digestion.

Nearly the same measure of grain was found sufficient for a fowl every day, whether it consisted of oats, buck-wheat, or barley; and hence, whichever of these three is cheapest at any time may be given without regard to other considerations. Variations in the appetite of the fowls may, perhaps, be occasioned by difference of seasons, and they may require rather more at one period than another; but it was ascertained, that in the months of January and February a common fowl, that had always, from morning till night, grain of one of those three sorts at its command, will eat of it daily about a fourth part of a pint measure. This is even rather more than an ordinary-sized fowl will eat, for where a quart was given to a very large cock and two Spanish hens, and the same to two hens of a middle size, and to three of the ordinary size, it was not all eaten. Some very voracious fowls of the largest size, however, will consume daily about the third of a pint measure.

As wheat is the most nutritive grain for human food, with the exception perhaps of rice, it might be supposed that it is also the best for fowls; and as they will eat wheat greedily, we might thence be induced to conclude that they would eat more of it than of barley or oats. Yet when fowls have as much wheat as they can con-

sume, they will eat about a fourth part less than of oats, barley, or buck-wheat, the largest quantity of wheat eaten by a fowl in one day being about three-sixteenths of a pint ; nevertheless, the difference in bulk is compensated by the difference in weight, for these three sixteenths of wheat will weigh more than four-sixteenths of oats.

The difference of weight in different sorts of grain is not in every instance the true reason why a fowl is satisfied with a larger or smaller measure of one sort than another ; for though rye weighs rather less than wheat, a fowl will be satisfied with a much smaller measure of this, even in most cases, so little as one-half. The seven hens and the large cock just mentioned, consumed daily a pint-and-a-half measure of wheat, while of rye they only consumed three-quarters-of-a-pint measure, and hence the average consumption of the rye by each, was to their consumption of wheat in the proportion of one to two.

Maize, Indian corn, or Cobbett's corn as it is sometimes termed, was found to rank intermediate between rye and wheat. When maize was exclusively given, the greatest eaters only consumed the first day about one-eighth of a pint measure, but by usage they came to relish it more, and the cock and seven hens, which were rather above the average rate of eaters, consumed daily one pint and a quarter of maize. Accordingly five-fourths of maize to them were equivalent to six-fourths of wheat and to three-fourths of rye.

The consumption of each sort of grain daily, by a

common fowl, will be rather too great, if we take the data furnished by what was eaten by the cock and seven hens, as some of these were of very large size and great eaters; though it is more convenient, for the practical purposes of estimating expense, to be above rather than below the average: what is spent less than what one is willing to spend becomes, in one sense, clear profit. We may therefore safely estimate, that a fowl of the common size, having as much as she can eat during the day, will consume,

	Pint.	Meas.
Of oats, buck-wheat, or barley	$\frac{1}{4}$	$\frac{8}{32}$
Of wheat	.	$\frac{6}{32}$
Of maize, or Indian corn	.	$\frac{5}{32}$
Of rye	.	$\frac{3}{32}$

Although, from the experiments already detailed, as made with wheat and rye, it appears that the average consumption is not always in proportion to the specified weight of the corn; yet it is of importance to know the relative weights of each grain in all such experiments. M. Réaumur, in order to ascertain the difference of weight of each grain in different circumstances, carefully weighed a pint measure of each as they came from the cornchandler's, when he found the weights to be the following.

	Oz.	Dr.	Gr.
Wheat	19	1	52
Rye	18	4	12
Maize	17	5	48
Buck-wheat	16	7	12
Barley	14	0	48
Oats	10	3	12

After weighing, each of the sorts of grain was put separately into a paper bag, and laid in a low and very damp room for nearly two months, when they were again weighed. The measure, which had been strooked in the first instance, was now found to have the corn considerably above the brim, owing to the increase of bulk from moisture : the weights were the following,

			Oz.	Dr.	Gr.
Wheat	.	.	19	3	48
Rye	.	.	19	3	36
Maize	.	.	17	6	12
Buck-wheat	.	.	17	0	48
Barley	.	.	13	7	12
Oats	.	.	10	3	12

The same grains, after the second weighing, were kept in a hot room of a uniform temperature, sufficient to hatch eggs, for three months successively, when they were again measured and weighed. They did not now fill the measure by a third of an inch, though they had stood above the brim when taken from the damp room ; the weights were the following :—

			Oz.	Dr.	Gr.
Wheat	.	.	18	1	54
Rye	.	.	18	1	18
Maize	.	.	16	3	18
Buck-wheat	.	.	15	7	36
Barley	.	.	12	6	6
Oats	.	.	9	5	12

These tables show that buck-wheat is considerably heavier than barley and oats ; yet a fowl will require as much by measure of buck-wheat daily to satisfy

her as of any of the other two sorts of grain. The cause of this apparent anomaly may, perhaps, lie in the peculiarity of taste, one sort of grain being more pleasing to their palate than another, and inducing them to eat gluttonously more than might suffice them, in the same way as dainties will induce ourselves to eat more than nature requires. In order to determine, if possible, the case in question, M. Réaumur had a partition made in the feeding-box, dividing it into two equal compartments, into one of which he put a measure of wheat, and into the other a measure of rye. Three hens and one cock were put to feed upon these, and did not show any preference to either of the sorts of grain, as there remained after their first morning's repast about an equal quantity of wheat and of rye; while in the course of the day they finished what they had left, emptying the two compartments almost at the same time.

Experiments of this kind, which ought to be repeated with all the sorts of food given to poultry, are important, for pointing out what sort of food is most to their liking, a matter of great moment in feeding, as it is a rule, with but few exceptions, that what is eaten with most relish agrees best, and is most easily digested. With a view to this point, M. Réaumur extended his experiments to other sorts of grain, by not only offering the fowls each sort in different compartments of their feeding-boxes, but also by putting a mixture of grains into the same box. He put a measure, for example, of wheat, and another measure

of oats, into the same box, and mixed them. A cock and a hen, to which this mixture was given, exhibited a greater liking to the wheat than to the oats, for there remained at night in the box a portion of the oats, about a fourth or a sixth part of the whole quantity, but there was not left a single grain of wheat. From a subsequent experiment, however, it appeared that it would have been too hasty to draw a general conclusion from the taste of this cock and hen. On the same day, there was given to a hen kept alone under a basket-coop, a measure of wheat in one compartment, and a measure of oats in another compartment, of the feeding-box. In the course of the day, this hen ate the whole of the oats to a grain, and left almost half of the wheat. A measure of rye was given to her next day, and she preferred eating that rather than the portion of wheat which she had left the day before. To the same hen was given a measure of wheat and oats mixed in equal quantities. At first she was seen to eat both sorts of grain, but as she continued to feed, the oats began to disappear, and the wheat to predominate, till at length every grain of oats was consumed, and about one sixth of the wheat was left untouched.

At another time, M. Réaumur gave to a cock and a hen, kept in the same hutch, three different sorts of grain, namely, maize, oats, and buck-wheat, each put separately in three different compartments of the feeding box. The cock came first to the maize, and after eyeing it for a time, he finally refused to touch it, but turned to the buck-wheat, of which he picked up a few

grains, and then went to the oats. He continued for some minutes to taste alternately a little of the one and a little of the other. On the other hand, the hen no sooner saw the maize than she pounced upon it voraciously, and never offered to quit it for either of the others. As the hutch confined their motions, he tried the effect of turning the box, so as to bring the maize opposite the cock, and the others more within reach of the hen; but the cock even then never offered to touch the maize, but went round to the other two sorts, while the hen also changed sides, and recommenced eating the maize with avidity. Next day, the same cock and hen were served with the three sorts of grain as before; but now the hen seemed as little disposed as the cock to try the maize, but fixed upon the buck-wheat, and the cock also evidently preferred this to the oats, of which, however, he from time to time ate some grains, leaving it directly for the buck-wheat, which between them was soon wholly consumed. What had been left of the oats was next eaten, and in the course of the day the maize was also consumed. It is necessary to remark, that the maize which is yellow-coloured is not so good as that which is reddish, or rather reddish-brown.

These experiments were varied and extended by giving to the seven hens, already mentioned, an equal quantity of each of the six sorts of grain usually given to poultry, each put separately into the compartments of a common feeding-box, the whole quantity given being calculated to serve two days. The first day, the whole of the buck-wheat was despatched; on the second

morning there was no barley left; the wheat and the maize were entirely consumed nearly at the same time, on the second afternoon; while a little rye and oats were left for the third day.

It would be superfluous to detail, with similar minuteness, the numerous experiments of the same kind, which were varied and combined in every possible way that M. Réaumur could devise, as he found it was by no means so easy as might have been previously supposed to determine the sorts of grain which fowls prefer. At first, it appeared that there were some hens which ate more readily any particular sort they had been most used to, than sorts entirely new to them. On the contrary, it also appeared, that the appetite of others was excited by any new sort. In a word, similar singularities of taste appear amongst fowls, with respect to particular sorts of food, as amongst ourselves. It is very certain, at least, it is not because one sort of grain is larger, heavier, or plumper than another, that they eat more or less of it, or prefer it to others; but it is probable that the grain of which they consume the least furnishes the greater proportion of chyle—the bland creamy fluid prepared by digestion to mix with the blood for promoting the growth and repairing the waste of the body—in a word, that which supplies the most nourishment. Experiments, which will be given elsewhere, proved that the sorts of food most easily digested by fowls, are those of which they eat the greatest quantity. Of the six sorts of grain already mentioned, they evidently became soonest tired of, and least partial to rye.

Experiments with boiled Grains.

It is the custom of poultry-keepers in France to cook the grain given to fowls which they intend to fatten, boiling it in water till it is soft enough to be easily bruised between the fingers, the boiling causing it to swell till the farina splits the enveloping membrane, and this they term bursting. Although it is the popular opinion that burst grain is better than when it is dry, for fattening poultry, this opinion has probably not been established on accurate experiments. Be this as it may, it is of no less importance to ascertain whether there is any difference of expense in feeding poultry on dry or on burst grain, that is, whether, under similar circumstances, fowls eat more or less of the one or of the other.

In order to ascertain this, M. Réaumur ordered four pint-measures of each of the six common sorts of grain to be boiled till they were well burst, and he found that the increase of bulk in each sort was the following:

	Pint measures.
Four pint-measures of oats, after being boiled to bursting, filled	7
Four pint-measures of barley, after being boiled to bursting, filled	10
Four pint-measures of buck-wheat, after being boiled to bursting, filled	14
Four pint-measures of maize, after being boiled to bursting, filled above	15
Four pint-measures of wheat, after being boiled to bursting, filled a little more than	10
Four pint-measures of rye, after being boiled to bursting, filled nearly	15

Rice swells considerably more by boiling than any of these six sorts, but it is rarely given to poultry, except for fattening, under the notion that it tends to whiten the flesh.

For the purpose of ascertaining whether the boiling altered the preference of fowls for any of the particular sorts, experiments, varied in every possible way, similar to those already detailed, were made by M. Réaumur. The fowls were furnished with two, three, four, five, and six different sorts, sometimes all the compartments of the feeding-box being filled with burst grain, each different from the other, and sometimes each sort of grain filled two of the compartments, one of them having nothing but boiled, and another nothing but dry grain. All that could be collected from these repeated experiments was, that the greater number of fowls prefer boiled grain to raw, though there are many of them which show a preference to the dry grain on certain days, and no permanency could be discovered in the preference shown for any sort of burst grain. Some fowls, for example, which one day preferred boiled wheat, would on other days make choice of buck-wheat, or maize, oats, or barley, and sometimes, though more seldom, even of rye; but rye, either boiled or raw, is the least favourite sort of grain. It follows as an important conclusion from such experiments, that we may make choice of the sort of grain which happens to be cheapest, without much, if any, disadvantage; always excepting rye, when other sorts are to be had on reasonable terms.

Other experiments were required to show whether there is any economy, or the contrary, in feeding poultry with boiled grain, and this was readily ascertained from knowing, first, how much dry grain sufficed one or more fowls, and then boiling the same quantity, and trying how much of that would in like manner be sufficient. The experiments made with the different sorts of grain were as follow :—

Rye, although so very considerably increased in bulk by boiling, so far from being more sufficing, becomes less so, as fowls will eat rather more of it when it is boiled than when it is dry. The seven hens and the cock, so often mentioned, which consumed only three-fourths of a pint-measure of dry rye in one day, ate in the same time three pint-measures of the boiled grain ; consequently, as three pint-measures of boiled rye are equivalent to four-fifths of dry, it would cost one twentieth more to feed fowls with boiled than with dry rye, four-fifths being one-twentieth more than three-fourths.

Oats, although increased in bulk by boiling nearly one-half, are not, any more than rye, rendered more sufficing ; for the fowls which in two days would have eaten four pint-measures of dry oats, consumed in the same time seven pint-measures of the boiled grain, consequently it is no saving to boil the oats.

Mowbray says oats are apt to produce the scour, and chickens become tired of them ; but that oats are recommended by many for promoting laying, and in Kent, Sussex, and Surrey, for fattening.

Buck-wheat, or brank, is increased in bulk by boiling

still more than oats, as four pint-measures, when well-boiled, swell to fourteen ; yet is there small benefit obtained by boiling buck-wheat ; for the fowls consume the fourteen pint-measures of the boiled grain nearly in the same time which four pints of the dry would have sufficed them. Mowbray says also that buck-wheat is an unsubstantial food.

Maize is, on the other hand, more profitable when boiled than when given raw ; for the fowls which would have got through a pint and a quarter of the dry maize, consumed only three pint-measures of the boiled grain, which are not equivalent to one of the dry. It was for two days only that they were able to eat in a single day three pint-measures of the boiled maize ; for after that, they either lost their appetite, or came to dislike it, as they could not get through more than two pint-measures of the boiled maize. Even calculating that they were to consume three pint-measures a day of the boiled grain, there would be a saving of more than one-fifth, and if they were satisfied with two pint-measures the profit would be much more considerable ; for this would not be equivalent to two-thirds of a pint-measure of the dry grain. The saving in this case would be one-third and one fifth, that is eight-fifteenths, or more than one-half.

Barley is also much more economical when given boiled than dry ; for fowls, which would have eaten two pint-measures of dry barley a day, ate but three pint-measures daily of the boiled grain. Therefore, as ten pint-measures of boiled barley are produced from four

pint-measures of dry, three pints of the boiled are equivalent to no more than six-fifths of a pint of the dry, consequently the experience in dry barley is to that of boiled as ten-fifths to six-fifths, that is, as ten to six, or as five to three, showing a saving of two-fifths by giving boiled instead of dry barley.

Wheat is shown by the preceding table to increase in bulk by boiling about the same as barley ; but experiments proved that the saving to be obtained by feeding fowls with boiled wheat, is not nearly so much as might thence have been anticipated ; for the same fowls which consumed three pint-measures of boiled barley in one day, ate three pint-measures of boiled wheat. Three pints of boiled wheat, however, are not equivalent to two pints of dry wheat, as in the case of the barley, but only one pint and a half of dry wheat, which was found to be the quantity consumed in one day by the same fowls. Now as a pint of boiled wheat is equivalent to no more than two-fifths of a pint of the dry grain, the three pints consumed a-day are equivalent only to six-fifths of dry wheat. Consequently the proportion of what they consumed of dry corn was, to what they ate of boiled, as fifteen-tenths to twelve-tenths, or as five to four ; hence there is a saving of one-fifth by feeding with boiled wheat, as there is of two-fifths by feeding with boiled barley.

These interesting experiments prove most clearly that in every case, when the price of maize, barley, or wheat, renders it eligible to feed poultry therewith, there is considerable economy in never giving the grain dry, but

well boiled. The expense of fuel, though it must be taken into the account, must be small in comparison with the advantage, particularly in families where large fires are constantly kept up, as a very trifling addition of fuel will be required to burst the grains. It may be well to repeat that there is no saving, but loss in fuel and trouble, by boiling oats, buck-wheat, or rye.

Pollard, Sharps, Middlings, and Bran.

With the intention of saving expense, the bran of wheat, or sometimes pollard, or middlings, is given to fowls; but these bruised skins, where little if any of the farina of wheat remains, appear to contain but a small quantity of nourishment, proportional to the cost price. M. Réaumur found by experiment that it is little or no saving to substitute bran for good grain in feeding poultry. Bran is not given dry, but mixed with water to the consistence of paste: some people boil this, but it does not increase the bulk, except in a very trifling degree, and is therefore of small advantage. He found that two measures of dry bran mixed with water, were consumed by fowls in the same time that they would have eaten a single measure of boiled barley, equivalent, according to the previous experiments, to three-fifths of a measure of dry barley.

I have myself found, that though it is no saving to substitute bran or pollard for corn, yet the bran or pollard is exceedingly useful to mix with pot-liquor, broth, or any other fat liquids from the kitchen, which the

fowls would not consume without the mixture of bran or pollard.

Rice and Millet.

Boiled rice might be supposed to be a very nourishing food for poultry, though it is too expensive for daily feeding, and they are at first exceedingly fond of it; but their liking for rice does not continue, and in a week or so they come to dislike it. One reason may be that it is too cloying; and were it mixed with some less nourishing substance, such as bran, the fowls would continue to relish it as they do barley.

Fowls always prefer raw millet to what has been boiled, though it would evidently be a saving in other respects to boil it, as boiling increases its bulk above one-half.

Tares, Peas, and Beans.

Where tares are at a low price, or peas or beans plentiful, fowls may be advantageously fed upon any of these, and they will be preferable boiled to being given in a raw state; for though they do not swell in boiling so much as rice or barley, the beans in particular may, when hard and dry, be too large for the fowls to swallow comfortably. Near Geneva, they feed their fowls chiefly upon tares.

Potatoes and other Roots.

As potatoes contain a great proportion of nutriment comparatively to their bulk and price, they constitute one of the most economical articles upon which poultry

can be fed. M. Parmentier advises that they should only be given for the purpose of fattening, since he thinks they will render the fowls so fat as to hinder them from laying. On the contrary, it agrees, I believe, with the experience of poultry-keepers in England, that potatoes are excellent for promoting the laying of fowls.

It is indispensable to give the potatoes to fowls not only in a boiled state but hot, not so hot, however, as to burn their mouths, as they are stupid enough to do if permitted. They dislike cold potatoes, and will not eat them willingly. It is likewise requisite to break all the potatoes a little, for they will not unfrequently leave a potato when thrown down unbroken, taking it, I presume for a stone, since the moment the skin is broken, and the white of the interior is brought into view, they fall upon it greedily.

Potatoes are unquestionably a cheap, wholesome, and excellent food for fowls, though it would require experiments similar to those of M. Réaumur, already detailed, with respect to grain, to ascertain the quantity which each fowl would consume when potatoes are supplied in over-abundance.

When pieces of raw potatoes are accidentally in their way, fowls will sometimes eat them, though they are not fond of these, and I question whether they are wholesome. They will not readily eat raw carrots or parsnips when these are thrown down to them whole, but when rasped, or cut into very small pieces, and mixed with pollard or oatmeal, these roots form both a

palatable and wholesome food for most sorts of birds, from the delicate nightingale to the hardy goose.

Boiled carrots, turnips, parsnips, Jerusalem artichokes, and similar roots, mashed up with bran or pollard, are also an excellent variety of food for poultry, and answer well for their evening repast, when grain has been given in the morning. Those who grow a good supply of these roots for kitchen use, can never therefore be at a loss to provide an acceptable meal for their fowls.

Green Food and Kitchen Scraps.

From seeing fowls, when left at liberty, greedily devouring plants and leaves, it is a common opinion that they will eat anything whatever which is green; but though they are nearly omnivorous with respect to green food, I have found by experiment, that there are many plants which they will not touch. Among the plants which I have observed them reject, are, foxglove, heartsease, geranium, spurge, convolvulus, and the leaves of strawberries, celery, parsnips, carrots, potatoes, onions, and leeks.

What they are most partial to are, the leaves of lettuce, endive, cabbage, spinach, radish, turnip, and all the mild succulent weeds, such as chick-weed, and miles or fat-hen. They also eat grass, and the leaves of most trees and shrubs, even those of box and other evergreens. M. Réaumur says that if hens have green plots to go a grazing in from morning till night, which they are naturally inclined to do, and which they will

be naturally compelled to do if they are sparingly fed with grain, the expense of keeping them will not be half what it would be as when they are furnished with as much boiled barley as they choose to eat.

M. Réaumur's experience also concords with our own with respect to other greens, and tells us that we need only throw into the yard the raw plants of lettuce, spinach, and such beets, cabbages, and the like, as are rejected in the kitchen, to furnish them with an agreeable and wholesome salad. From these sources a considerable quantity of food may be provided for poultry at most seasons of the year; and in this way a great saving may be effected in the consumption of grain.

Poultry, however, are not the better for being fed entirely on raw greens. M. Réaumur had a row of spinach in his garden, which having run to seed, he had taken up, and fed with it four hens and a cock kept in confinement. They were plentifully supplied with the spinach, and had no other sort of food. In a few days, they began to show symptoms of relaxed bowels or scour, and in eight or nine days their combs became pale and livid, a certain sign of bad health in fowls, as the paleness or lividness of the lips is in ourselves.

I have found that they will sometimes prefer kitchen greens boiled, to raw, at other times the reverse; but cabbage and spinach are still more relaxing to them boiled than raw. M. Parmentier says, that when the leaves of celery are boiled up with the other greens, or a quantity of salt added, that the relaxing effects are prevented. He recommends giving poultry all the

refuse and slops of the kitchen, such as bits of spoiled fruit, parings of apples, and the like; but I have found that my fowls are not fond of the latter.

The left pieces and crumbs of bread, pie-crust, fragments of pudding and dumplings, all fowls are very fond of. M. Parmentier, indeed, had bread made expressly for fowls, by mixing flour and meal made from different sorts of grain, and baking it in the usual way. Of this poultry-bread he made a soup, in what way he does not inform us, but he says the fowls were very fond of it when given to them hot, and it proved to be a great saving of corn.

There can be little doubt that biscuit-dust from ships' stores, which consists of biscuit mouldered into meal, mixed with fragments still unbroken, would be an excellent food for poultry, if soaked in boiling water, and given them hot. It is thus used for feeding pigs near the larger sea-ports, where it can sometimes be had in considerable quantity, and at a very reasonable price. It will be no detriment to this material, if it be full of weevils and their grubs, of which fowls are fonder than of the biscuit itself.

Earth-worms as Food for Poultry.

A fowl appears to be delighted when, after having scratched up the ground, she discovers an earth-worm, on which she does not fail to pounce with avidity; but as her companions are as fond of worms as herself, it frequently happens that they no sooner see it in her bill than they snatch it from her. There is not, indeed,

any food of which poultry generally are so fond as of earth-worms. It may appear to some a chimera to feed fowls upon these worms, or even to substitute them in part only for the bushels and loads of corn which a numerous poultry-yard will require ; but those who think so, cannot have any knowledge of the immense number of these worms with which the ground is everywhere stocked, designed by Providence, it would appear, as a portion of the supply of food for different species of animals, such as the mole, and many sorts of birds. During the winter, indeed, worms form the chief subsistence of crows, rooks, magpies, jackdaws, woodcocks, snipes, plovers, lapwings, redbreasts, besides partridges and pheasants, though the latter are not so partial to them.

In the most plentiful years, husbandmen, by dint of the hardest labour, are not able perhaps to raise in their fields, when ploughed and sown, a number of ears of corn containing grain equal in weight to that of the worms which lie hidden in those very fields ; indeed, there are probably in each field more worms than ears of corn, and while many a worm weighs more than the largest ear of corn. But the land that swarms with the greatest number of worms, and those of the largest size, is not so much arable land as cool, moist pastures. Worms also multiply very much in gardens, where, though they prefer the light-dug soil, they are compelled, on account of their numbers, to disperse even under the compact naked walks, which they deform by their excrements, voided in the night, in the form of

little spiral heaps of slimy earth. By going out with a light at night, in calm, mild weather, the worms may be seen in multitudes all over the walks and grass-plots, though it requires caution to observe them, for, though they have no eyes which we can discover, they certainly dislike the light, and withdraw into their holes suddenly when a candle is brought to shine strongly upon them. It may be shown from such observation, that we do not exaggerate, when we say, the produce of different kinds of grain, procured by hard labour and at great expense, is not by much so considerable as the provision of worms, hidden under-ground, and designed, as it would appear, by Providence, for the food of birds. The question then is, how we can render this abundance of worms available as food for poultry.

In order to make a plentiful collection of worms in a short time, anglers, who use them for bait, are acquainted with two methods; both on the principle of causing the worms to come out of their holes. Under-ground, the worms have a formidable enemy in the moles, whose chief food consists of worms; and hence all worms are instinctively afraid of any motion in the ground, which when they observe, they make their way with all haste to the surface. It is said, that the lapwing and some other birds, as if aware of this instinct of worms, stamp upon the ground with their feet, to cause the worms to come above-ground. It might be from these birds that the anglers, in order to obtain a supply for bait, stamp hard upon the ground. A more effectual method is, to thrust a strong stake, or a three-pronged fork, such as

is used for digging up potatoes, into the ground, to the depth of a foot or so, and to jerk it backwards and forwards, so as to shake the soil all around. By either of these methods, anglers, in less frequently than half-an-hour, succeed in collecting a pint or more of worms.

Another method is, to go out at night with a light, particularly when there is dew or has been rain, and look for the worms that are then lying on the surface of the ground in the gardens, garden-walks, grass-plots, or pastures. These worms, however, as has been remarked above, are very easily alarmed; though, with caution and dexterity, a great many, and those chiefly of the largest size, may be captured.

The rooks and some other birds teach us by example a fourth mode of making a considerable collection of earth-worms: they follow the plough from morning till night, and pick up without trouble the worms which are turned up. In digging up garden-ground, a still greater number of worms are brought into view. Children may accordingly be employed to imitate the rooks by following the plough or the digger, in order to collect a great quantity of worms for the fowls of a poultry-yard; and were a small price given for worms per pint, the poultry-keeper would soon, in most places, get a considerable supply.

Were worms, however, made the staple food of our poultry, it is obvious that they would be very badly and unequally fed, if they were dependent on the collections which might be made every day. Worms know how to dive very deep into the ground, in long droughts

and cold weather, in order to shelter themselves from these changes; and then they cannot be procured by any of the preceding methods. To provide against such temporary scarcities of worms, they must be stored similarly to other provisions (keeping them alive of course, as fowls will not eat dead worms)—in such places as they may be got at without difficulty whenever they are wanted.

Worms may be stored with facility, in casks filled about a third full with earth, in which they will live well, though they should be equal in bulk to the earth, or even more. Families who might be induced to employ their children in collecting worms, could have large casks filled with them in this manner, and might sell them by measure when required by the keepers of poultry. The only care requisite would be, to prevent the earth in the casks from becoming too dry, by sprinkling at intervals with a little water. It is equally necessary that the earth be not too moist, for though worms like moisture, they are readily drowned when they have too much of it. It is consequently indispensable to cover the casks in rainy weather. M. Réaumur having left uncovered a cask that had been filled with worms collected in the garden, the rain rendered the earth too moist, and all the worms were killed, at a time also when he could not easily renew his supply.

Another mode of supplying fowls with worms, is to have in the poultry-yard a hollow made, proportionate in extent to the number of fowls. It ought to be at least a foot deep, and coped with stones like a water

reservoir. The bottom should be covered with a layer of earth two or three inches thick, and kept moist by watering it when necessary. Worms when collected in the fields should be thrown upon the earth. The fowls will be fond of scratching among such earth, and it will be a healthy exercise for them to look out in this manner after the worms. It will be important, from the considerations already mentioned, to have the hollow so constructed, that the superfluous water may drain off through a grating, the holes being made so small, that no worms could pass through it and escape.

Verminier of M. Olivier de Serres.

The father of rural economy in France has given minute directions for constructing a place, termed a verminier, for the generation of worms to supply a poultry-yard, and save the consumption of corn. He directs a hollow place to be dug, from ten to twelve feet square, and three or four feet deep, and so sloped at the bottom as to allow any superfluous water to drain off. When the hollow cannot, from the nature of the ground, be sloped sufficiently for this purpose, instead of a hollow, a low platform may be raised, inclosed by a brick or stone wall three or four feet high, like a small court.

This inclosure, whether hollow or raised, should have the bottom strewed over with rye or any other straw to the depth of about half a foot, upon which must be laid a quantity of fresh and unmixed horse-dung to the same depth, and this again is to be covered with lightly sifted earth. Over the earth must then be

poured a quantity of blood with entrails of animals, or any garbage that can be procured, mixed with chaff. Each of the layers should be about the same thickness of half a foot, and the several ingredients may be repeated in the same order, to the whole depth of three or four feet. When this has been done, it must be covered over with strong thick bushes, and stones laid over them ; both to prevent the winds from deranging it, and to keep the fowls from scratching it. The rains will soon render the whole sufficiently moist to produce the putrefactive fermentation throughout the mass ; and there will then be engendered myriads of worms. These must be regularly husbanded, however, otherwise the fowls would soon devour the whole, whatever might be the number.

On building the verminier, a small gate-way ought to be left in the south or the east wall, and closed with a stone or board ; and here, when the worms are sufficiently grown, the first opening is made to distribute them in the yard. It is the French practice to give the fowls first in the morning a quantity of corn, considerably less than they would eat for breakfast, had they as much as they could consume. When the corn has been all picked up, the verminier is opened, and a few spadefuls of the mass with the worms in it, is thrown into the yard. Upon this the fowls eagerly pounce, and scatter it about till they have got every worm it contains. It is not even then useless, for being mixed in part with the droppings of the fowls, it becomes excellent manure.

By proceeding regularly in this way, taking out only

a few spadefuls of the worm compost at a time, and keeping the gateway closed, and the bushes at top, the provision will last a considerable time. It will, of course, require some fresh bushes to protect the face of the compost heap, when a good portion of it has been dug away; but when the greater part has been scattered in the yard, the whole may be thrown open for them to search for the worms that may be left.

If the number of fowls kept be considerable, there may be two or more verminiers established in different states of progress, so that when one is exhausted, another may be ready to be opened. The verminiers are even more important in winter than in summer, as in the cold season there is less variety of food procurable from herbage and insects. It need scarcely be added, that they will not answer well in winter, unless they be situated in a place well sheltered from cold winds; with a slight roof over the verminier, but open at the sides for the free circulation of air. In very hard frosts, it will be necessary to cover in the worm compost with some hot stable dung, otherwise the worms will go deep into the ground, so that they cannot readily be reached by the spade.

Too many worms ought never to be given to fowls, as this renders them too fat, and stops them from laying. M. Réaumur fed a hen entirely on worms for a fortnight, and she seemed very well pleased with her fare. She grew very fat, and as she had as many as she could devour, her appetite, so far from decreasing, became every day more keen. At first she ate about

a pint, soon increased to a quart, and at last she devoured nearly three pint measures.

Amongst my own poultry, I have found that some individuals, either altogether dislike, or are very indifferent to worms as food, while others are voraciously fond of them. About half-a-dozen Spanish fowls, which had been reared in a rather confined place would not at first touch them, and more than one plateful collected in the garden were left untouched by them. A year afterwards most of these fowls learned to eat worms, but only one or two became very fond of them. I found the same variety of taste in young chickens.

I have also observed, that at particular times fowls will not eat worms at all, and suppose that the worms are in that case labouring under some disease ; or, if they are about to deposit their eggs or cocoons, it may be explained on the same principle that cows do not eat grass gone to seed in the meadows.

It is well remarked by M. Réaumur, on the subject before us, that worms are both useful and economical, as food for poultry. Useful novelties are often in danger of being neglected, and how great soever the advantage, new practices require lucky circumstances to bring them into general repute. Example is one of the best means of promoting such useful novelties ; and he recommends gentlemen in the country to save their corn, by partly feeding their poultry upon worms, that the practice may spread by imitation among the neighbouring farmers.

Snails and Insects as Food for Poultry.

I have found that my fowls are no less fond of shell snails, than they are of worms, though they do not much relish slugs. It is not indeed so easy, in every locality, to obtain any large supply of snails, as it is of worms; yet, in many places, children could make considerable collections of snails, with advantage also to any of the cultivated grounds adjacent. This sort of food would tend to fatten still more than worms; and when the fowls are not intended for laying, but to be killed for the table, snails will not deteriorate their flavour, as I believe worms will always do more or less.

There is no sort of insect, perhaps, which fowls will not eat. They are exceedingly fond of flies, beetles, grasshoppers, and crickets, but more particularly of every sort of grub, caterpillar, and maggot, with the remarkable exception of the caterpillar of the magpie moth (*Abraxas grossularia*), which no bird, that I know, will touch. It is not easy, however, to supply fowls with large quantities of any of these. In places where cockchafers or maybugs abound, children might, for the few weeks of their flight, collect a number; but, what would be more advantageous, they might be set to collect the grubs of this destructive insect after the plough, and, while ridding the fields of these underground depredators, provide a rich banquet for the poultry. I have seen, in France, bushels of these grubs collected and thrown away, by farmers, who did not know their value as a food for poultry.

Where silk-worms are extensively reared, there are always abundance of the pupæ, after winding off the silk, not required for the purposes of breeding: these are excellent for poultry, and are much relished. M. Parmentier, however, says, that too much insect food is not wholesome.

It is likewise a good practice to throw pailfuls of blood upon dunghills where fowls are allowed to run about; for this entices swarms of flies thither to deposit their eggs, and these, when hatched, produce swarms of maggots for the fowls. With the same view, any sort of offal or garbage may be thrown out, provided that the dunghill is not near enough the dwelling-house to give annoyance by its exhalations.

M. Réaumur mentions the circumstance of a quantity of wheat stored in a corn-loft being much infected with the caterpillars of the small corn-moth, which spins a web, and unites several grains together. A young lady devised the plan of taking some chickens to the loft, to feed on the caterpillars, of which they were so fond, that in a few days they devoured them all, without touching a single grain of the corn.

Butcher's-meat, Fowl, and Fish, as Food for Poultry.

From the ravenous voracity with which fowls pounce upon any scrap of meat they meet with, we might suppose that they are more carnivorous than granivorous. This, however, is only observed from the meat being an accidental tit-bit. Were they fed entirely on meat, without any grain, for some time, they would manifest

the same voracity for the latter. But it is well to take advantage of this omnivorous propensity to make use of every scrap of meat and offal which would otherwise be lost, as such must always assist in saving the quantity of corn which they would otherwise require. Fowls will pick bones much cleaner than any quadruped is able to do, and they do not despise the flesh of their own kind. Fish is no less welcome to them than flesh, and they are as fond of it salted as fresh.

It seems to make little difference to them, whether any sort of animal food is raw or boiled, though perhaps what is raw is most highly relished; at least they are fond of blood, which they will sip up from the ground, where it has been shed, till not a drop remain. Hence, when any of their companions are wounded, they will continue to peck at the wound to procure the blood, and even an individual, when wounded in a place where it can reach with its beak, will greedily drink its own blood. When the young feathers accordingly are beginning to grow, and are accidentally broken, so as to cause them to bleed, both the individual and its companions continue to squeeze and draw the injured feather as long as it furnishes any blood. They often also, when they take to this, attack the sprouting feathers which are sound, and force out the blood, to the great injury of the individual.

Frequently, while squeezing and pulling at the sprouting feathers, they are drawn out by the roots, and in that case are uniformly swallowed entire. Fowls that have learned this bad habit, come in time to relish

any sort of feathers which they can swallow, whether they be young and full of blood or not. They will in that case often pull feathers out of their companions, sometimes to so great an extent as to leave large patches upon the haunches or the rump quite bare of feathers ; and as the young feathers which grow on these places are still more relished, they are pulled out and devoured almost as fast as they grow. I had some fowls, chiefly of the Spanish breed, so much addicted to this bad habit, that they kept one another in a very unsightly state. The only remedy is solitary confinement for the stripped individuals, till the young feathers are well bearded.

Pieces of suet or fat they like better than any other sort of animal food ; but this, if supplied in any quantity, will soon render them too fat for continuing to lay. Should there be any quantity of such fat to dispose of, it ought therefore to be given at intervals, and mixed or accompanied with bran, which will serve to fill their crops, without producing too much nutriment.

It is scarcely requisite to mention, that when meat of any sort is given to poultry, unless it be very tender, or easily pulled to pieces, as suet is, it must be minced, otherwise they will not find it easy to eat it ; and if long pieces of membrane be left, it may in some instances choke them.

It will often be advantageous, when there is abundance of scraps of meat and bones, to boil them well, and mix bran or pollard with the liquor ; while the pieces of meat will be rendered more easy to divide, when given either entire or well minced.

PAIRING.

WE are too imperfectly acquainted with the habits of the common fowl, in a wild state, to know whether the cocks always associate with the hens, or only occasionally ; but if we were to reason from analogy, (which in such cases is seldom safe,) we know that the wild turkey-cock does not throughout the year associate with the hen though in the tame state he is brought to do so ; and in some, though not in all of the species of grouse, the males very soon desert the females, caring nothing about them or their progeny, to lead a solitary life. (*C. Bonaparte, Amer. Ornith.* iii. 29.)

Though hens will lay some eggs without pairing with a cock, as this is not natural, the number will, for the most part, be less, and the laying uncertain, and hence it is indispensable to attend to the laws of nature in this respect.

Like sheep, black cattle, and other gregarious animals, fowls are polygamous, and therefore it is not requisite that there should be as many cocks as hens, like the pigeons in the dovecot, for it is more natural that one cock should have a number of hens, and authors differ considerably with respect to the proper number.

Number of Hens to one Cock.

The numbers of hens severally recommended to one cock, are from four, to twenty-five. It may be well to give the several authorities for particular numbers.

About two thousand years ago, Columella says—

"Twelve hennes shall be sufficient for one good cocke, which will cause them to be rather of one coloure, and yet," sayeth he, "our auncestors did use to give but five hennes to one cocke, which caused them rather to be of divers coloures, some white, some gray, some reddish, and some tawnye, some blacke, and some of a speckled coloure, which are not thoughte to be so good as the red and grey speckled: and to have the hennes all of one coloure (some the white) are best, and they are counted the best laiers." (*Mascall*, c. 15.) Stephanus repeats the directions of Columella.

Bradley, in his *Farmer's Director*, advises, under January, to examine the number of poultry, and leave a cock to seven or eight hens, in order to render the eggs fertile for hatching, and causing the summer breed of chickens to be strong. The same number is recommended by the author of the *Complete Farmer*, and in *Rees's Cyclopædia*.

M. Parmentier, one of the best French writers on poultry, remarks, that one cock is *much more* than sufficient for fifteen or twenty hens, and for this obvious reason, that he can give proofs of his reproductive vigour at least fifty times a day, provided he be a young healthy bird.

Those who breed game-cocks are particular in limiting the number of hens to four or five, for one cock; but it is important to remark, that their object in this is the breeding of strong chickens, whereas, when eggs are more in request for the market than chickens, the number of hens need not be so very limited.

Mr. Lawrence says, that a correspondent of his, in France, in 1815, informed him that the French housewives, on hearing of his restriction of half-a-dozen hens to one cock, made themselves merry at what they reckoned useless expense, as they usually allow four times the number; but, by attending to what has already been stated, it may be inferred, that both practices may be right, according to the object in view. Mr. Lawrence says, that in winter, a cock should only have four hens, and in cold damp weather we doubt not he may be right. M. Bosc says, it is only in spring, when fertile eggs for hatching are wanted, that one cock should have fewer than twenty hens.

The old writers were very particular in giving the good properties of cocks, as much so as our cattle-breeders at present in similar circumstances. According to Columella, who is so frequently copied without acknowledgment, "It is not good to keep a cocke, if he be not stout, hot, and knavishe, and of the same colour as the hennes are, with as many clawes. But, in his body, to be hier raised, his combe to be hye, and red as blood, and straight withall, his eyes blacke, or azure coloure, his beke short and crooked, with a gray crest, shining like red or white, and all his feathers, from the head to the breast, to be of a changeable coloure, varying like gold or yellow; his breast large and bigge; his muscles on his wings bigge, like one's armes, with long wings; his tail fayre and long, with two ranks of crooked and rising feathers; and to be oft crowing, is a sign of lusty courage. The red colour is thought to be

the best cocke, his legges short and stronge, his thyes greate and thicke, and well covered with feathers, and armed with long spurs, rough and poynted,—strayhte of body, light, fyerce, eager in battayle, vigilante, readye, and often crowing, and not easily fearde.” (*Mascall*, c. 3.)

Markham does not differ much from the preceding. He says—“The cock should be of a large and well-sized body, long from the head to the rumpe, and thicke in the girth; his necke should be long, loose, and curiously bending, and his body together being straight and high uprected, as the falcon, and other birds of prey are; his combe, wattles, and throat, should be large, of great compasse, jagged, and very scarlet red; his eyes round and great, the colour answering the colour of his plume or male, as gray with gray, red with red, or yellow with yellow; his bill should be crooked, sharpe, and strongly set on to his head, the colour being suitable to the colour of the feathers on his head; his mayne, or necke-feathers, should be very long, bright, and shining, covering from his head to his shoulders; his legs straight, and of a strong beame, with large long spurres, sharp, and a little bending, and the colour blacke, yellow, or blewish; his claws short, strong, and wrinkled; and his tail long, and covering his body very closely.” (*Cheap and Good Husbandrie*, p. 138.)

The choice of a cock, says M. Parmentier, is a very important thing. He is considered to have every requisite quality, when he is of a good middling size, when he carries his head high, has a quick, animated look, a strong and shrill voice, short bill, a fine red comb,

shining as if varnished, wattles of a large size, and of the same colour as the comb, the breast broad, the wings strong, the plumage black, or of an obscure red, the thighs very muscular, the legs thick, and furnished with strong spurs, the claws rather bent and sharply pointed. He ought also to be free in his motions, to crow frequently, and to scratch the ground often in search of worms, not so much for himself, as to treat his hens. He ought, withal, to be brisk, spirited, ardent, and ready in caressing the hens, quick in defending them, attentive in soliciting them to eat, in keeping them together, and in assembling them at night.

In breeding game-cocks, the qualities sportsmen require in a brood-cock, are every mark of perfect health, such as, a ruddy complexion, the feathers close, short, and not feeling cold or dry; the flesh firm and compact, while he ought to be full-breasted (betokening good lungs), yet taper and thin behind; full in the girth, well coupled, lofty and aspiring, with a good thigh, the beam of his leg very strong, the eye large and vivid, the beak strong, crooked, and thick at the base.

All authorities agree, that a cock is in his prime at two years old, though we have ourselves had cocks of four months so precocious, as to show every mark of full vigour, while others of the same brood did not appear in this state for many months afterwards.

It is by no means unfrequent, however, to see unskilful persons keep cocks with their hens for six or eight years, when they are quite useless, though they may live on even till the age of twenty years. At three

years old, a cock begins to lose the sprightly gait and bright colour which distinguished him at two. The length of his feathers increases, and his hackles become of too loose a texture, and dangle over his throat. He then becomes lazy, languid, and inactive, and is fonder of sunning himself, and of pulverising in the dust, than of attending to the hens.

As soon as the marks of declining vigour are perceived, the cock must be displaced, to make way for a successor, which should be chosen among the finest and bravest of the supernumerary young cocks, that ought to be reared for this special purpose. In making a choice between two cocks, which appear equally fine and vigorous, try them by making them fight together, and select the conqueror; for, as M. Parmentier well remarks, hens, like other females, always prefer the male who shows most courage and spirit.

The change of cocks is of much importance, and is frequently very troublesome to manage; for peace does not last long between them when they hold a divided dominion in the poultry yard, since they are all actuated by a restless, jealous, hasty, fiery, ardent disposition, and hence their quarrels become no less frequent than sanguinary. A battle soon succeeds to provocation or affront. The two opponents face each other, their feathers bristling up, their necks stretched out, their heads low, and their beaks ready for the onslaught. They observe each other in silence with fixed and sparkling eyes. On the least motion of either, they stand stiffly up, and rush furiously forward, dashing at each other

with beak and spur in repeated sallies, till the more powerful or the more adroit has grievously torn the comb and wattles of his adversary, has thrown him down by the heavy stroke of his wings, or has stabbed him with his spurs.

This pugnacious character arises wholly from the jealous disposition, originating in the cock's salacity. "Now," says Mascal, after Columella, speaking of a jealous cock, "to slake that heate of jealousie, ye shall slitte two pieces of thicke leather, and put them on his legges, and those will hang over his feete, which will correct the vehement heat of jealousie within him."—(*Husbandlie Order. and Govern.* c. 3.) "Such a bit of leather," says M. Parmentier, "will cause the most turbulent cock to become as quiet as a man who is fettered at the feet, hands, and neck."

Cocks and hens, though very social and gregarious, are far from being indiscriminate in their attachments, and when a new cock is introduced upon the death or removal of another, it is often difficult to establish harmony between them. The hens may not like him, or he may not like the hens. Of the first sort of antipathy, that of the hens to a cock, M. Réaumur mentions the following very striking instance. Hens, indeed, are, no less than cocks, often of a hasty, petulant, and violent temper, often quarrelling and fighting with one another almost as furiously as cocks; but it is not so very usual to see the hens attack a cock, as happened in one of M. Réaumur's coops, in which he kept two hens and a cock.

The two hens in question, after having lived in very good understanding with the cock, and after having laid eggs which he had rendered reproductive, took an aversion to him, and never ceased to peck him with their beaks from morning till night. They soon stripped his head of feathers and made it bleed, while he never himself acted on the offensive, and scarcely tried to avoid their attacks. His mildness did not soften their fury, which continued to increase till they tore his head and neck in a pitiful manner, and at length, in five or six days, killed him outright.

In the room of the cock which had thus been killed, M. Réaumur substituted one which was very strong, sound, and beautiful ; but the hens soon showed themselves no less furious against him than his predecessor. After he had been a day and a half with them, they had so abused him that his life appeared to be in danger ; and as he was too fine a cock to be thus sacrificed, he was removed from the two harpies and set at liberty. Two other cocks were successively tried, but with the same success, so that they had to be removed within two or three days, to prevent their being killed ; and no more were given them, as it appeared they would have successively killed all those in the poultry yard.

On the other hand, a cock will sometimes show similar spite and aversion to particular individual hens, chiefly, though not always, such as are old. We had once a red cock, which so persecuted a large black Spanish hen, though he had previously lived for months on good terms with her, that she was as much in danger

of perishing of hunger as from his furious buffetings, for he would not allow her to eat a mouthful if he could help it. We tried every probable expedient to break him of this, and, amongst others, whenever he attacked the hen, we beat him about with a silk handkerchief till he was out of breath ; but though this punishment was repeated more than twenty times a day, he seemed altogether incapable of understanding the cause of it, and the moment we left them alone, he renewed his attacks on the poor hen. We then shut him up in a corner of the yard, where he could see what was going on, but could not get near any of the hens ; and after thus confining him for a day and a night, we turned in to him the hen he detested. His salacity at first got the better of his aversion, but in a few minutes, he began to attack the creature which he had just been caressing. We then beat him well for the exhibition of such bad passions, but he was incorrigible, and we were compelled to abandon all hopes of improving his disposition. It may not be out of place to remark, that the chief favourite hen of this cock was a small black hen, the oldest in the yard, and by no means in good health. There is no accounting for such singularities of taste.

The cock is fond of cleanliness, and very careful of the appearance of his plumes, and hence he may be frequently observed pruning and dressing his feathers with his bill ; and although he may not have the ambition, like the nightingale and the thrush, of excelling in his notes, it may be inferred that he is particularly jealous of proving his voice to be loud, shrill, and powerful.

Hence when he has crowed in his strongest manner, he always listens to know whether he may be answered by any rival or neighbour, and if so, he replies by a strain, if possible, louder and bolder than the first.

Choice of Hens.

The good qualities of hens, whether intended for laying or for breeding, are of no less importance to be attended to, than those of cocks. Old Leonard Mascall, following Columella and Stephanus, says, "The signes of a good henne are these: to be of a tawnye colour, or of a russet, which are counted the cheefest coloures, and those hennes nexte which hath the pens of their winges blackishe, not all blacke, but parte. As for the gray and the white hens, they are nothing so profitable. The henne with a tuft of feathers on her head is reasonable good; and the low featherde henne also. Their heads oughte not to be great and their tails ought to be in a meane, and her brest large, and her body deepe and long, for the greatest hennes of body, are not the aptest hennes to lay, nor yet for that purpose so naturale. As for those hennes which have hinder claws, they will commonly breake their egges in sitting thereon, and they sit not so surely as others, and will ofttimes eat their egges. As for those hennes which doe call or crowe lyke the cocke, or doth croke and scrape to help the same, ye shall pluck off the greatest fethers of her wings, and give her millet-wheat to eat." (*Husbandlie Ordering*, c. 4.)

In breeding game cocks, sportsmen are very parti-

cular in selecting their hens; "for," says Gervase Markham, "they are like birds of prey, in which the female is ever to be preferred and esteemed before the male; and so in the breed of these birds you must be sure your henne be right, that is to say, she must be of a right plume, as grey, grissell, speckt, or yellowish—blacke or browne is not amisse. She must be kindlie to her young, of large body, well pockt behind for large egges, and well tufted on the crowne, which shewes courage." (*Pleasures of Princes*, p. 41.)

Sketchley gives somewhat different properties for a game hen, which should not, he thinks, be large, making up for deficiency in size, by the size of the cock; but like the cock, they should have lofty necks, short and close feathered, with clear sinewy legs, not giving way in the bone, well set thighs, and long, clean, taper toes.

"When hens," says Lawrence, "have a large comb or crow like a cock, they are generally deemed inferior; but he has, notwithstanding, had hens with large rose combs, and also crows, equal to any in his stock."

M. Parmentier tells us, that in selecting hens, they should be chosen of a middling size, of a black or brown colour, of a robust constitution, and with a large head, bright eyes, the comb pendent, and the feet bluish. He advises to reject crows and such as are savage, quarrelsome or peevish, because such are seldom favourites with the cocks, scarcely ever lay, and do not hatch well. He also properly rejects old hens, meaning such as are above four or five years; as well as those which are too fat, and those whose comb and claws

are rough, this being a sign of their having ceased to lay.

After the common hen, which on account of her fecundity is deservedly esteemed, the tufted hen may be, according to M. Parmentier, justly ranked, particularly from being more delicate eating, because she fattens more readily, on account of laying less. The large breed, though less prolific, is preferable in rearing chickens for the market, or for making capons. The general opinion of breeders, with regard to these three sorts is, that the first is more prolific in the number of eggs, while the others produce larger chickens which bring good prices.

The test of the truth of these opinions would be to keep an account for a whole year, of outlay and of produce, distinguishing each sort of hen,—and whether the greater number of eggs, though of smaller size, compensate for the fewer number and larger size in proportion to the food consumed by each—inquiries, however, which are more minute than most persons will trouble themselves to make, though where profit and loss are concerned, they appear to be indispensable.

Laying.

There seem to be naturally two periods of the year when fowls lay, early in spring, and afterwards in summer; indicating, that if fowls were left to themselves, they would, like several wild birds, produce two broods in a year.

In warmer countries, young healthy fowls most

usually begin to lay in February, some sooner, and some not so soon, according to individual constitution, and other circumstances ; but, as cold has a great effect on the process, the season of laying is not so early in colder latitudes ;—and the knowledge of this fact, as we shall presently see, has been taken advantage of to anticipate the natural period.

When a hen is near to the time of laying, her comb and wattles change from their previous dull hue to a bright red, while the eye becomes more bright, the gait more spirited, and she occasionally cackles for three or four days. These signs rarely prove false ; and when the time comes that a hen wants to lay, she appears very restless, going backwards and forwards, visiting every nook and corner, cackling the while as if displeased because she cannot suit herself with a convenient nest. Not having looked out for one previously, she rarely succeeds in pleasing herself, till the moment comes she can no longer tarry, when she is compelled to choose one of the boxes or baskets provided for this purpose in the fowl-house. There she settles herself in silence and lays.

In some instances, a hen will make choice of a particular nest to lay in, and when, on desiring to lay, she finds this nest preoccupied by another hen, she will wait till it is vacated ; but in other cases, hens will go into any nest they find, preferring, for the most part, those which have the greatest number of eggs. The process of laying is most probably rather painful, though the hen does not indicate this by her cries, but the in-

stant she has done, she leaves the nest, and utters her joy by peculiarly loud notes, which are re-echoed by the cock, as well as by some of the other hens. Some hens, however, leave the nest after laying, in silence.

The eggs ought to be taken from the nest every afternoon, when no more may be expected to be laid; for if left in the nest, the heat of the hens, when laying next day, will tend to corrupt them.

With respect to fecundity, some hens will lay only one egg in three days, some every other day, and others every day. If we may credit the Polish naturalist Rzaczynski, (*Hist. Nat. Polon.* p. 432), and Bentekal (*Voyage aux Indes Orientales*, p. 234) there are in Samogitia, in Malacca, and elsewhere, hens which lay twice a day; and Aristotle mentions a breed of Illyrian hens which laid as often as thrice a day.

The laying of hens continues, with few interruptions, till the end of summer, when the natural process of moulting puts a stop to it, because all superabundant nutriment is required for promoting the growth of the new feathers; and the cold weather which succeeds, prolongs this period of rest. Each successive year, the period of moulting is later, and consequently, the older a hen is, the later in the spring does she begin to lay.

Artificial Modes of promoting Laying.

“Man,” says M. Parmentier, “who thinks of nothing but his own interest, has attempted several means of rousing hens from their torpidity, when they

cease at the natural period of the year to lay, inasmuch as it seems very hard to pass through the winter without the luxury of eating new-laid eggs."

The methods adopted by the ancients were, rich and stimulant feeding. "Ye must," says Mascall out of Columella, "mixe their meat with chalk, and put water fresche into their troughs with some wine and water mixte, and so let them have it daylye for a space. Or give them of barlye halfe soddan, and mixte with tares, or the graine called millet wheate. Hennes doe commonly cease laying about the third of November, when the colde begins to come, and then feeding on blackberries, elder, and other fruite. But for being troubled, ye might choose of the fairest hennes to lay eggges all the winter, as well as at other times. Which order is, ye must nourish them with toasted bread, soked in ale, or small-wine, mixte with some water. Some doe take of water and milke, and soake the toastes therein from the evening to the morning, and so give it to them on the morrow to their breakfast, and at night they give them oates or barlye." (*Husbandlie Ordering*, c. 10.)

Lawrence says, old hens are seldom to be depended upon for eggs in winter, such being scarcely full of feather until Christmas; and then, probably, may not begin to lay till April, producing, at last, not more than twenty or thirty eggs.

M. Réaumur made several experiments with a view to the object in question. A certain class of food and of seeds, he says, are much extolled in many places, as tending to promote the laying of eggs, but nothing has

yet been determined in this respect upon rational principle and experiment. The laying time of hens would no doubt be greatly more advantageous than it is, if the periods could be determined by our choice; for in this way, the number of eggs laid by the hens of a poultry-yard, might be distributed in a far more equable manner over the several months of the year, and if, as is probable, each hen can only produce a certain number of eggs, we should be glad to have a portion of their yearly produce in winter. The necessity we are under of keeping great quantities of eggs longer than the season when they are laid, causes an immense quantity to be spoiled every year, from too long keeping, or want of proper precaution in preserving them—and hence the importance of the question—whether it may not be possible to make hens lay in winter.

“I made,” says M. Réaumur, “a few slight attempts towards this object, but had no success. I tried every way to prevent the hens from being affected by the severity of the winter, by keeping them in poultry-houses warmed by the hot-beds which were employed in artificial hatching, and in bringing up the newly-hatched chickens. I fed some hens for a whole month together with hemp-seed, which people pretend to be better adapted than any other food to make them lay. But in those trials, I did not succeed in procuring a single egg. I do not thence, however, infer that the warm temperature of the air is an indifferent circumstance for promoting the laying of hens, nor that there is no food capable of answering that purpose. I have

seen the laying of eggs stopped at once in hens which had no other food than spinach, and it is probable there are sorts of food capable of producing quite a contrary effect ; but such food, even when discovered, will be of no use, unless given at a proper season, that is, when the hen is in a laying condition.

“Hens moult and cast their feathers once every year. It is the approach, the duration, and the consequences of this period, which put a stop to their laying. The moulting season is critical for all birds. All the period which it lasts, even to the time that the lost feathers are replaced by new ones, till these are full grown, the wasting of the nutritive juices, prepared from the blood for the very purpose of promoting this growth, is considerable ; and hence it is no wonder there should not remain enough in the body of the hen, to enable her to perfect her eggs.

“It is not, therefore, accurately speaking, the cold of winter that hinders hens from laying : a fact strongly proved, when we advert to the circumstance, that many hens lay in January and February, which months are usually much colder than October, November, and December, when the same hens did not lay. It is, notwithstanding, a matter of fact, that severe colds affect them, and stop, or at least decrease their laying ; so that the hen which laid an egg every day, will often miss one or two days successively.

“Now if any hens happen to lay eggs again very early, it is always those which have cast their feathers sooner than the others, or which have sooner recovered

from the moulting illness. It would therefore appear, that the means of causing hens to moult more early than usual, would also be the means of causing them to lay eggs during the first winter months. Would not this secret consist in robbing them of their feathers in the spring, or the beginning of summer? Could such forced or premature moulting prevent that which nature would infallibly have required later, from becoming necessary? Moulting does not seem to be necessary, unless when the quills of the feathers cease to derive any nourishment from the body and dry away. In these circumstances, the nutritive juices, which they no longer appropriate to themselves, go to nourish the new feathers, sprouting at the base of each of the old and dry ones. These new feathers grow, and in process of time force off the old ones; which fall off to make room for their successors.

“The stripping off the feathers in spring to anticipate the autumnal moulting may therefore be sufficient to make hens lay in winter. It may be useful, however, to forewarn any one who may wish to attempt this experiment, that in robbing a hen of her feathers, natural moulting must be imitated by taking them off gradually. Her life might be endangered, if she should be entirely stripped of them at once, or even within a few days; and it will not be too long to extend the operation to about a fortnight or three weeks. It will of course be a necessary consequence of such an experiment, that during the time of it, and probably for a month or more afterwards, the hens stripped of their feathers will cease to

lay ; but this loss must be balanced against their laying again when eggs are scarce.”—(*L'Art de faire éclore.*)

The experiment suggested by the French naturalist, might possibly produce eggs in winter, but it is to be hoped that few persons in the present day would be cruel enough to try it.

It will be less troublesome and no less rational, as pullets commence laying before older hens, and do not moult the first year, to have an early summer brood hatched in April or May, which will begin to lay about Christmas. In fact, by attending to the period of hatching, hens may be got to lay all the year. A friend informs us, that a neighbour of his in this way has a brood of chickens soon after Christmas, which, by being carefully sheltered from the cold and wet, and fed once a day on boiled potatoes—*hot*, begin to lay early the ensuing winter.

“When,” says M. Bosc, “it is wished to have eggs during the cold season, even in the dead of winter, it is necessary to make the fowls roost over an oven, in a stable, in a shed where many cattle are kept, or to erect a stove in the fowl-house on purpose. By such methods, the farmers of Auge have chickens fit for the table in the month of April, a period when they are only beginning to be hatched in the farms around Paris, although farther to the south. It would be desirable that stoves in fowl-houses were more commonly known near great towns, where luxury grudges no expense for the convenience of having fresh eggs.”

It is worthy of remark, that the Irish peasantry,

whose poultry occupy at night a corner of the cabin, along with the cow, the pig, and the family, frequently lay very early in consequence of the warmth of their night quarters; and there can be no doubt that this is the chief secret for having new-laid eggs in winter, paying at the same time due attention to protect the hens from wet, and to have them young, or at least early in moulting.

EGGS.

As all useful practical details are, or ought to be, founded on good reasons for what is done, or what is not done, it becomes important, in a work like the present, to state, so far as known, the reasons on which the practice is founded. These reasons are in fact the science, a word which practical men are but too apt to laugh at or condemn, from misapprehending its nature; we shall therefore say a few words respecting

The Structure of Eggs.

Upon opening, after death, the body of a laying-hen, a cluster of eggs, or rather the rudiments of eggs, may be observed, from twenty to a hundred or more, from the size of a pin's head to that of a boy's marble, according to the different stages of their growth. This batch of rudimental eggs, or Egg-cluster, is termed by anatomists the *Ovarium*, and the rudimental eggs themselves are called *Ova*.

It is necessary to observe here, that a rudimental egg or *ovum* has no shell nor white, which are acquired in

an after-stage of its progress, but consists wholly of yolk, on whose surface the germ of the future chick lies ; both



Fig. 12.—Egg-cluster, or Ovarium.

the yolk and the germ being wrapped round with a very thin membrane, or *streffan*, as it is termed in the north.

When the rudimental egg, still attached to the ovarium, becomes larger and larger, and arrives at a certain size, either its own weight, or some other efficient cause, detaches it from the cluster, and makes it fall into a sort of funnel, leading to a pipe which anatomists term the *Oviduct*.

Here the yolk of the rudimental egg, hitherto imperfectly formed, puts on its mature appearance of a thick yellow fluid, while the rudimental chick or embryo, lying on the surface, at the point opposite to that by which it had been attached to the ovarium, is white, and somewhat paste-like.

The white or *albumen* of the egg now becomes dif-

fused around the yolk, being secreted from the blood-vessels of the egg-pipe or oviduct, in the form of a thin, glairy fluid ; and it is prevented from mixing with the yolk and the embryo chick, by the thin membrane which surrounded them before they were detached from the egg-cluster, while it is strengthened by a second and stronger membrane, formed around the first, immediately after falling into the oviduct. It is proper to mention also, that this second membrane, enveloping the yolk and the germ of the chick, is thickest at the two ends, having what may be called bulgings, termed *chalazes* by anatomists ; these bulgings of the second membrane pass quite through the white at the ends, and being thus as it were embedded in the white, they keep the inclosed yolk and germ somewhat in a fixed position, preventing them from rolling about within the egg when it is moved.

The white of the egg being thus formed, a third membrane, or rather a double membrane, much stronger than either of the two first, is formed around it, becoming attached to the bulgings or *chalazes* of the second membrane, and tending still more to keep all the parts in their relative positions.

During the progress of these several formations, the egg gradually advances about half-way along the oviduct. It is still however destitute of the shell, which begins to be formed by a process similar to the formation of the shell of a snail, as soon as the outer layer of the third membrane has been completed. When the shell is fully formed, the egg continues to advance

along the oviduct, till the hen goes to her nest and lays it.

From ill-health or accidents, eggs are sometimes excluded from the oviduct before the shell has begun to be formed, and in this state they are provincially termed *oon* or *wind* eggs.

Reckoning then from the shell inwards, there are six different envelopes, one of which only could be detected before the descent of the egg into the oviduct.

1. The shell.
2. The external layer of the membrane lining the shell.
3. The internal layer of the same lining.
4. The white, composed of a thinner liquid on the outside, and a thicker and more yellowish liquid on the inside.
5. The bulgings or chalaziferous membrane.
6. The proper membrane.

One important part of the egg which we have not hitherto noticed is the air-bag, or *folliculus aeris* of the anatomists, placed at the larger end, between the shell and its lining membranes. It is, according to Dr. Paris. about the size of the eye of a small bird in new-laid eggs, but is increased as much as ten times in the process of hatching.

This air-bag is of such great importance to the development of the chick, probably by supplying it with a limited atmosphere of oxygen, that if the blunt end of an egg be pierced with the point of the smallest needle (a stratagem which malice not unfrequently suggests) the egg cannot be hatched, but perishes.

From the air-bag being thus placed at the blunt end of the egg, important signs may be taken to distinguish the freshness of an egg; for as the air in the cell will not abstract heat from without, like a more solid substance, it is a usual practice to apply the tongue to the blunt end of an egg, and if it feels rather warm, it is stale, but if cold, it is fresh. This, however, is a much more uncertain test than the comparative size of the small circle seen by the transmitted light of the candle or otherwise, a small circle being a proof of freshness, and a large one of staleness.

Instead of one rudimental egg falling from the ovarium, two may be detached, and will of course, be inclosed in the same shell, when the egg will be double-yolked. If these double-yolked eggs be hatched, they will produce, rarely two separate chickens, but more commonly chickens with two heads and the like.

The shell of an egg, chemically speaking, consists chiefly of carbonate of lime, similar to chalk, with a small quantity of phosphate of lime and animal mucus. When burnt, the animal matter and the carbonic-acid-gas of the carbonate of lime are separated, the first being reduced to ashes or animal charcoal, while the second is dissipated, leaving the decarbonised lime mixed with a little phosphate of lime.

The white of the egg (*albumen*) is without taste or smell, of a viscid, glairy consistence, readily dissolving in water, coagulable by acids, by spirits of wine, and by a temperature of 165° Fahr. If it has once been coagulated, it is no longer soluble in either cold or hot water,

and acquires a slight insipid taste. Experiments show that it is composed of eighty parts of water, fifteen and a half parts of albumen, and four and a half parts of mucus, besides giving traces of soda, benzoic acid, and sulphuretted hydrogen gas. (*Bostock's Physiology.*)

The latter we observe, on eating an egg with a silver spoon, to stain it of a blackish purple, by combining with the silver, and forming sulphuret of silver.

The yolk has an insipid, bland, oily taste, and when agitated with water, forms a milky emulsion. If it be long boiled, it becomes a granular, friable solid, yielding upon expression a yellow, insipid, fixed oil. It consists, chemically, of water, oil, albumen, and gelatine. In proportion to the quantity of albumen, the egg boils hard.

The white of the egg is found to be a very feeble conductor of heat, retarding its escape and preventing its entrance to the yolk; a contrivance of Providential Wisdom, not only to prevent speedy fermentation and corruption, but, as Dr. Paris remarks, to avert the fatal chills which might occur in hatching, when the mother-hen leaves her eggs from time to time in search of food. Eels, tench, and other fish, which can live long out of water, secrete a similar viscid substance on the surface of their bodies, furnished to them no doubt for a similar purpose. (*Linneæan Transactions*, x. 306.)

Preservation of Eggs.

The ancients had very imperfect notions of preserving eggs fresh, if they knew no other method than what the elder Pliny says—"The best way to keepe egges is in bean-meale or floure, and during winter in chaffe, but for summer time in branne." (*Holland's Plinie*, i. 301.) This would no doubt preserve them longer than if they were left entirely uncovered, but it could not be depended upon, as we shall presently see, no more than the similar advice of Columella, who says—"The manner to keep egges a long tyme is, in the winter in straw, and in summer in branne or meale. Some doe put them fyrst five or sixe houres in fine beaten sault, and then they wash them and lay them in straw or branne, and some keepe them among beanes, and others keepe them in bean-meale, and some doe let them remayne in unbeaten sault, and other some doe soak them in brine or salte-water; but like as these doe keepe them from rotting, yet thereby they will diminishe and waste, and they will not be so full of meate as those which are newly layde: wherefore the best is, if they trouble you, to sell them, because those which are put in brine cannot so long be kept full, but will waste." (*Mascall's Husbandlic Ordering and Govern. of Poultry*, ch. 8, 12mo. London, 1581, black letter.) Mascall is right in saying it is better to keep them cold than hot.

Old Gervase Markham says—"Because egges of themselves are a singular profit; you shall understand that the best way to preserve or keepe them long is, as

some thinke, to lay them in straw, and cover them close, but that is too cold, and besides will make them mustie : others lay them in branne, but that is too hot. The best way to keepe them most sweet, most sound, and most full, is only to keepe them in a heape of old malt, close, and well covered all over." (*Cheape and good Husbandrie*, p. 142. 4to London, 1616.)

In Picardy, the lacemakers buy fresh eggs of the farmers during the months of October and November, and put them on shelves against the walls of their rooms, where they are sheltered from the cold. They turn them very often, to prevent the wood of the shelves communicating to them any dampness, which might spoil them. Every week they examine these eggs by transmitted light, and when they find any beginning to look less fresh, they sell them immediately, and keep the others for a later and better market. (*Parmentier*.) This practice of turning the eggs in order to keep them is supposed to have been suggested by the hatching-hen instinctively turning the eggs on which she sits; and some writers think it is supported by the fact that, in stale eggs, the yolk is invariably found at the side against the shell, though this is clearly the consequence of the membrane's being weakened or destroyed by putrefaction, and not by any means a cause; and though no doubt the hen turns her eggs only that her warmth may be equally distributed to them all.

Nothing was known scientifically on the subject of preserving eggs till M. Réaumur was led to take it up,

from the analogy suggested to him when he was pursuing his researches on retarding or forwarding the appearance of butterflies from their chrysalides. In order to follow this ingenious experimenter, it will be necessary to observe what takes place in an egg when it becomes stale or rotten.

All eggs, then, after being laid, lose daily by transpiration a portion of the matter which they contain, notwithstanding the compact texture of their shell, and of the close tissue of the flexible membranes lining the shell, and enveloping the white. When an egg is fresh, it is proverbially full without any vacancy, and this is matter of common observation whether it be broken raw, or when it is either soft or hard boiled. But, in all stale eggs on the contrary, there is uniformly more or less vacancy in proportion to the loss they have sustained by transpiration; and hence, in order to judge of the freshness of an egg, it is usual to hold it up to the light, when the translucency of the shell makes it appear whether or not there be any vacancy in the upper portion, as well as, whether the yolk and white are mingled and muddy, by the rotting and bursting of their enveloping membranes.

It required the more recondite researches of Bellini and Valisnieri to discover the pores through which eggs transpire. In the membranes enveloping the white and the yolk, there are conducting passages of communication between the internal air in the egg and the exterior air. These passages are easily demonstrated if an egg is placed in a glass of water, in the receiver of

an air-pump and the air exhausted, when bubbles of air may be seen issuing from the egg into the water. The transpiration of moisture can be proved by putting an egg into the receiver of an air-pump, and exhausting the air, when the liquid within the shell will be seen oozing through the pores, and moistening the whole.

Another proof of the existence of air within an egg, and its communication with the internal air, is that a chick may be heard to chirp in an egg whose shell is still unbroken even in the minutest point : a fact which, though it has been denied, was proved by M. Réaumur, who examined, with a magnifying-glass, several eggs in which the chicks chirped, without discovering the smallest chink besides the ordinary pores of the shell.

The transpiration of eggs, besides, is proportional to the temperature in which they may be placed, cold retarding, and heat promoting the process ; and hence by keeping fresh laid eggs in a cool cellar, or, better still, in an ice-house, they will transpire less, and be preserved for a longer period sound, than if they are kept in a warm place, or exposed to the sun's light, which has also a great effect in promoting the exhalation of moisture.

We can now see that the meal and bran employed by the Romans in Columella's time, as well as the ashes used to cover eggs by the French peasants, are only imperfect means of stopping the transpiration and consequent loss of substance, and that they can have but little influence in preventing fermentation and putri-

dity, which can only take place by communication with the air at a moderate temperature. But by entirely closing the pores in the shell of the egg, both transpiration and putrid fermentation are rendered impossible.

The first material which M. Réaumur tried, was spirit of wine varnish, made with lac. He coated some new-laid eggs with this in the middle of April, and had some of them cooked in July, after they had sustained rather hot weather, when he found them as curdy and fresh as if they had just been laid. He preserved some varnished eggs for one, and others for two years, and found that, when cooked, the white appeared curdy and good, but they did not taste so nice as those preserved only two or three months, though they were still eatable. They tasted, in fact, like eggs which had been soaked some days in water,—another method of keeping them longer fresh practised in France, but by no means a good one. In another work, however, written at a later period, M. Réaumur says it was impossible to distinguish the varnished eggs which had been kept for a year from those newly laid, (*L'Art de faire éclore, sub fin.*) a fact probably derived from experiments made afterwards.

It is an indispensable condition of the material used for stopping the pores of the shell of the egg, that it should not be capable of being dissolved by the moisture transpired from the interior, and the varnish fulfilled this condition; but, unfortunately, though varnish is not very expensive, it is not a common article in country places where eggs are most abundantly pro-

duced, while the country people, besides, are not easily brought to make use of anything to which they have not been accustomed.

In order to get over this difficulty, M. Réaumur was led to try other substances, and soon found that another material, very cheap and everywhere to be had, would very well supply the place of varnish. This material was fat or grease, such as suet, lard, or dripping; but the best of these was proved to be a mixture of mutton and beef suet melted together over a slow fire, and strained through a linen cloth into an earthen pan; when thoroughly melted, an egg was dipped into it, and immediately taken out again, when it was in a fit state to be kept for twelve months or more. Five pounds of this melted fat might prepare all the eggs produced in a neighbourhood in one season.

The chief inconvenience attending this method is, that the eggs cannot so easily be plunged into the fat, as that the whole surfaces be covered with it; for if they be held in a pair of pincers or tongs, the parts of the egg by which it is held will not be greased over. This difficulty was got over by using a thread with a loop, previously well greased, to plunge the eggs in.

The chief advantage in the use of this fat rather than varnish is, that the eggs rubbed over, will boil as quickly as if nothing had been done to them, the fat melting off as soon as they touch the hot water; whereas the varnish, not being soluble even in hot water, only becomes moistened by it, and still hanging about the egg, prevents the transpiration of the juices

necessary to bring the egg into that state in which it is to be eaten. When the egg, on the other hand, which has been preserved by the fat, is taken out of the water, there remains very little fatness upon it, and what there does, is easily wiped off upon a napkin.

The method of preserving eggs by means of fat, is greatly preferable also to that of varnish, when they are intended for putting under a hen to be hatched; for the fat easily melts away by the heat, while the varnish remains and impedes the hatching. By this means, the eggs of foreign fowls might be carried to a distance, hatched, and naturalised in this and other countries.

The transpiration of matter from the egg, was proved to be as effectually stopped by the thinnest layer of fat, as by a thick coating, so that no sensible vestige be left on the surface of the shell. All sorts of fat, grease, or oil were found well adapted to preserve eggs. M. Réaumur used butter, hog's lard, olive oil, and similar substances, and thereby preserved eggs for nine months, as fresh as the day on which they were laid.

The ingenious experimenter also varied the mode of applying the fat or oil to the eggs. It is only requisite, he says, to take on the end of the finger the bigness of a pea of butter, or any other fat, and rub it all over the shell, by passing and repassing the finger so that no part be left untouched. Or the tip of the finger may be dipped into a saucer of oil, and pass it over the shell in the same way. If it is required to have the eggs look clean, and not smeary from the operation, they may be

wiped with a towel; for enough of fat or oil goes into the pores to prevent all transpiration, without any being left on the spaces of the shell between the pores.

Whether these experiments of M. Réaumur's are known to the farmers in the north of Ireland we are not aware, but they, at all events, know well how to act upon his principles. One of the articles of store provisions which these farmers prepare for their sons who attend the Scottish universities in winter, is butter and eggs. A layer of butter, salted in the usual way, is put at the bottom of a firkin several inches thick, and over this a number of fresh eggs are stuck, which are covered with another similar layer of butter, and this is repeated alternately till the cask is full. Accordingly, as each successive layer of butter is consumed, a fresh quantity of eggs are uncovered, and they are usually as fresh and good, as we can answer from having repeatedly eaten them at the breakfast tables of our friends, as if fresh laid. It would, we conceive, be an excellent mode of preparing eggs for sea store.

There is another method of preserving eggs a long while fresh, depending on very different principles from the preceding, but well worth notice. We are indebted for the discovery, if indeed it may be termed one, to the same ingenious French experimenter, M. Réaumur. Having remarked that there was a very great difference among eggs as to the rapidity with which they became unfit for use and putrid, he investigated the causes of this difference, and found, that it was the eggs which had not been rendered reproductive by the cock, that

continued long uncorrupted. He kept four hens in a large coop without a cock, and after they began to lay non-reproductive eggs, these, though subjected to the heat of hatching ovens, remained sound for forty or fifty days together, whereas reproductive eggs would either have been hatched in about twenty days, or have become quite putrid; for thirty or forty days in air of the temperature of a hen's body must tend more to corrupt, than a great many months of an air which has only the common temperature of the atmosphere.

In order, therefore, to have eggs to keep fresh from spring, to the middle or even the end of winter, it is only necessary to deprive the hens of all communication with cocks, for at least a month before the eggs are put away. Without knowing this people often find, among the eggs they buy, some which soon spoil, and others that will keep for a long time. "I have bought eggs," says M. Réaumur, "of one of my farmer's wives, whom I knew to be incapable of deceiving me by selling me stale ones, and two-thirds, and sometimes three-fourths of the eggs, on being put into the hatching ovens proved to be unproductive. The good woman was equally ignorant that, although her eggs were not fit for hatching, they were excellent to be kept."

Eggs are also said to keep well when preserved in salt, by arranging them in a barrel,—first, a layer of salt, and then a layer of eggs, alternately, as we have mentioned that the Irish farmers preserve eggs in butter. This can only, however, act mechanically, like bran or saw-dust, so long as the salt continues dry, for in

that case the chlorine, which is the antiseptic principle of the salt, is not evolved. When the salt, however, becomes damp, its preservative principle will be brought into action, and may penetrate through the pores of the shell.

The dealers are reported to have recently discovered that immersing eggs in vitriol or sulphuric acid is a very effectual means of preservation, and it is very probable it is so ; for the sulphuric acid will act chemically on the carbonate of lime in the shell, by setting free the carbonic-acid-gas, while it unites with the lime, and forms sulphate of lime or plaster of Paris. The pores of the shell will in this way be closed up with plaster of Paris, and in a more minute and effectual way too than could be done by its direct application.

M. Gagne says, that a very excellent method of preserving eggs is, to mix a bushel of quick-lime, two pounds of salt, and eight ounces of cream of tartar together, adding a sufficient quantity of water, so that an egg may be plunged in to the point. When a paste has been made of this consistence, the eggs are put into it, and may be kept fresh, it is said, for two years.

Another way to preserve eggs is, to have them cooked in boiling water the same day they are laid. On taking them out of the water they are marked with red ink, to record their date, and put away in a cool place, where they will keep, it is said, for several months. When they are wanted for use, they are again put into hot water to warm them. The curdy part which is usually seen in new-laid eggs, is so abundant, and the taste is

said to be so well preserved, that the nicest people may be made to believe they are new-laid. At the end of three or four months, however, the membrane lining the shell becomes much thickened. Eggs so preserved have the advantage of not suffering from being carried about.

In the East Indies, it is said that such cooked eggs are boiled hard, salted, and done over with a paste made with clay, cinders, and sea salt.

It ought not to be overlooked, with respect to the preservation of eggs, that they not only spoil by the transpiration of their moisture and the putrid fermentation of their contents, in consequence of air penetrating through the pores of the shell ; but also, by being moved about, and jostled when carried to a distance by sea or land. Any sort of rough motion indeed ruptures the membranes which keep the white, the yolk, and the germ of the chick in their appropriate places, and upon these becoming mixed, putrefaction is promoted.

The practice of painting eggs has led some to suppose that it was a trick of the egg-dealers about the end of winter, to conceal in this manner the marks of staleness in their eggs ; but, though this may perhaps occur in some instances, the custom originated in a very different circumstance. It was thought fit by the Greek Church to forbid during Lent, not only the eating of meat, but of eggs, though they begin at that time to be plentiful. The people, therefore, bore this forty days' privation with great difficulty, and looked forward with joy to the day when they might eat fresh eggs with impunity, and as they were devout, they deemed it right to have the

first eggs they used at Easter hallowed, by taking them to the churches. They were then sent as presents to their friends ; and as a sort of decoration for such presents, the eggs were stained red, blue, and other colours, variously shaded and painted : this custom still prevails in Poland.

HATCHING.

IN order to have eggs successfully hatched, they must, 1st, have been rendered reproductive from previous treading of the cock ; 2nd, they must be fresh ; 3rd, they must be subjected to an equable temperature, of about 96° Fahrenheit, or 32° Réaumur, during at least three weeks ; and 4th, they must not be exposed to noxious or bad smelling effluvia, or moisture. These conditions are all indispensable, and will therefore require to be separately considered more at length.

Choice of Eggs for Hatching.

When it can conveniently be done, the eggs of one's own hens should be selected, as being more to be depended on than those which are purchased, whose age may be uncertain. As eggs for successful hatching, besides being fecundated by a young healthy cock, ought never to be older than from three weeks to a month ; they should be selected when laid, of the largest size, and from the best breeds, the day of the month written with red ink upon the shell, and placed in bran, into which their own weight will sink them, with their larger ends, where the air-bag is situated, placed uppermost. Sketchley recommends turning them every two

days, to prevent the yolk from being displaced, but unless the membranes be ruptured by putridity, or by shaking, this displacement cannot take place, and therefore the frequent turning of the eggs is a piece of unnecessary labour. He is correct, however, in recommending them, if carried to a distance, to be shaken as little as possible, for concussion is almost certain to injure them.

All very small eggs, which have generally no yolk, and those which are ill-shaped, or of equal thickness at both ends, must be rejected. The latter is the usual shape of such eggs as have double yolks, which, though good for cooking, are not so for hatching, because, though they may sometimes prove reproductive, the chickens are usually monsters with two heads, four legs, and the like. Instances have occurred, but rarely, when twin-chickens were hatched from the same egg.

“From intense observation,” says Mr. Sketchley, “I have generally found that the round egg produced the female, and those of oblong form the male;” but this is no new observation, nor a discovery of his own; for Mascall, out of Columella and Stephanus, says, “If ye will have them to be females, take the roundest wrinkled egges, and also to have them all males, take the long rough egges. Also some doe chuse the egge with the hollow crowne in the side of the toppe for the females, and the crowne in the toppe under the shell for the males.” This does not seem to be very intelligible, but it may perhaps refer to what M. Parmentier considers to be a discovery. Formerly, he tells us, pointed eggs

were chosen to produce cocks, and round ones to produce hens ; now they are known by more certain signs. Examine the eggs, by holding them between the eye and a candle, and if the vacancy caused by the air-bag at the blunt end of the egg, appear to be a little on one side, it will produce a hen ; if this vacancy be exactly in the centre, it will produce a cock.

Eggs have sometimes been tested by their specific gravity, putting them into milk-warm water, and rejecting all those which are not heavy enough to sink to the bottom. It can do no harm to try this test.

The number of eggs to be set under a hen must vary according to the extent of her wings, and to the temperature of the weather. "The common order to set egges," says Mascall, "is in odd numbers, as seven, nyne, eleven, thirteen, &c., whiche is to make them lye round the neste, and to have the odde egge in the midst ;" but as the hen after being set, may sometimes lay more, the eggs should all be marked, and if any fresh ones be laid they should be removed, as they will be too late in hatching.

Sometimes a hen will break her eggs with her feet, and in all such cases, the broken eggs must be removed as soon as observed, otherwise the hen may eat them, and from that may be tempted to break and eat the sound ones, and spoil the whole hatch.

Hatching Nests.

The place appointed for hatching must be clean, warm, dry, and have a southern aspect ; and the nests

should be so disposed as to prevent the hens, while sitting, from being interrupted by the other fowls in the yard. This differs, with respect to the circumstance of dryness, from the direction given by others. "Hens," says an author, "should be allowed to sit on the ground, as the rising damp, it is said, assists very materially in incubation ; whereas when the fowls sit upon floors, or in erected boxes, the eggs become so dry and parched, as to prevent the young from disencumbering themselves of the shell, and in their exertions they forfeit their lives. Hens in a state of nature make their nests on the ground. This method, however, cannot, at all times, be acted upon, unless the nest be properly secured from vermin, particularly from rats, as these animals will frequently convey away the whole of the eggs from under a hen."

The mode of making the nests of sitting hens of moss or heather, as practised in her Majesty's poultry houses at Windsor (*see* p. 30), offers a medium between the natural habits of the hen, and the dryness of a wooden box, filled with straw. The heather also affords the hen an opportunity of freeing herself from those insects which are frequently so troublesome to hens when sitting. As, however, it may not always be convenient to have boxes filled with heather, the nests for the sitting hens may be made in baskets or wooden sieves, like those used for clearing seeds by gardeners, lined with coarse flannel or baize ; or, as a modern writer recommends, a round earthen pan, with shelving sides, like those used in the Midland Counties for milk, may

be adopted. When this is the case, hay is sometimes used for stuffing the nest ; but though soft at first, hay soon becomes hard and matted, and short straw or fern is preferred. Hay is also said to breed vermin ; and long straw is objected to, because if the hen should catch her foot in it, and drag it after her when she leaves her nest, she will disturb and probably break her eggs. It must be again repeated, that when a hen becomes broody, that is, seems inclined to sit, it is best to indulge her ; as her health is seriously injured by being checked, and her eggs, if she is forced to resume laying, are said not to be wholesome.

Choice of a Sitting Hen.

So far as the variety of breeds is concerned, it holds almost generally that hens which are the best layers are the worst sitters. Black fowls, particularly the large Spanish and Polish breeds, are remarkable for being bad sitters, while the white-legged Dorking is almost invariably a good sitter. As a general rule, those hens which have short legs are good sitters, while those which stand high on their legs are not. Old hens, again, are always more steady in sitting than pullets, and are also more attached to their chickens, and not so prone to quit them too early. Pullets, indeed, were formerly never allowed to sit before the second year of their laying, though now, when they show a strong desire to sit, it is generally thought best to indulge them.

Females of birds are usually disposed to sit as soon

as they have done laying ; but hens frequently form an exception to this rule, from being induced to continue laying the greater part of the year, by means of abundant food, and by the deception practised upon them of removing their eggs as soon as they are laid. In this way, they, for the most part, far exceed the number of eggs necessary for a brood, without evincing the least desire to sit.

The desire to sit is made known by a particular sort of clucking, which is continued till the chickens are full grown, and a feverish state ensues, in which the natural heat of the hen's body is very much increased. The inclination, or, as physiologists term it, the *storge* (*στοργη*) soon becomes a strong and ungovernable passion. The hen flutters about, hangs her wings, bristles up her feathers, searches everywhere for eggs to sit upon ; and if she finds any, whether laid by herself or others, she immediately seats herself upon them.

These signs of an inclination to sit ought generally to be indulged in all hens ; but those are best adapted for sitting which have rather short legs, a broad body, large wings, well furnished with feathers, and their nails and spurs not too long nor sharp.

In France and Germany, many practices are recommended, which are rarely, if ever, adopted in England ; as for example, some persons make trial of a hen by leaving her to sit on a nest, for a few days, upon half-a-dozen chalk eggs ; and if she continue to sit with constancy, she is pronounced to be a good sitter, and the proper number of eggs are given to her. M. Parmentier

directs the sitting hen to be placed gently on the nest containing the eggs, and to be covered with a cloth, which ought only, he says, to be taken off once a day, to allow her to eat and drink. When it is desirable to have a brood of chickens at any particular season, and no hen evinces a disposition to sit, sitting is artificially promoted by various methods, consisting of the use of stimulant food, such as toast steeped in ale, artificial warmth, particularly at night, and depluming and irritating the body with pepper steeped in vinegar, or with stinging-nettles and other methods, too cruel to be recommended.

It had long been known, that it was sufficient to place a hen upon eggs in a dark place, as warm as possible, to induce her to sit ; but a Mademoiselle Portebois, not satisfied with this, devised a sort of hatching-box, so narrow that the hen should not be able to turn in it ; and when she was set upon the eggs, she tied to the hen's tail, with a thread, a piece of wood, about half-a-pound weight, so as to cover her back. The darkness, the impossibility of disembarassing herself of the piece of wood, and the uneasiness which it caused, obliged the poor hen to sit upon the eggs ; and in five or six days the piece of wood was removed without the hen attempting to leave her nest.

This plan, in ordinary cases, appears both unnatural and cruel, but if a hen that has been sitting should leave her nest before the eggs are hatched, the plan of Mademoiselle Portebois may be resorted to ; or, as another writer on the subject recommends, the poultry-keeper

may "give the hen half a wine-glass full of gin, and swing her round and round till she becomes stupefied, then having ready an iron pot, that has been set on the fire with some straw in it till the straw is warm, the eggs may be put on the straw, and the hen set on them, covering the pot so as only to leave a very small space for air." (*Parkinson on Live Stock*, vol. ii., p. 353.) Both methods are, however, so revolting, that most persons would prefer being without chickens to having recourse to them.

M. Parmentier also directs hens to be wrapt up, leaving only the head and tail free, to be set upon stale eggs for two or three days, and at the end of that time, when the hens have been habituated to sit, to substitute good eggs for the stale ones. This method, together with feeding them with wine-sops and sugar, mustard-seed, and the dried leaves and seeds of nettles, may be resorted to if hatches be wanted in winter, when hens are rarely of their own accord inclined to sit; but as Markham justly says, it is of no use to recommend such methods in England, as no one feels inclined to try them.

Process of Hatching, and the Attention it requires.

Some direct the eggs to be marked in order that it may be observed, when the hen leaves the nest to feed, whether she has been careful to turn them, in order to let them all have the benefit of equable heat. "If the henne," says Mascall, "be negligent to turne her egges,

and do not sit close, or even on them, it were good sometymes, when she is gone abroad, gently to turne them."

On the contrary, M. Parmentier says, that when the eggs have been placed under the hen, they must never after be touched, and she must be left to turn them as she thinks proper, and to bring those on the outside to the centre, in order to warm them all equally alike. A hen knows all this instinctively, much better than the most intelligent keeper. This view is strongly proved by the fact, that when hens take to laying in the fields, and sitting on the eggs which they have thus concealed, they return to the poultry-yard with a brood of chickens, for the most part, in much better health and feather than any which the most skilful artificial management can produce.

The sitting hen will sometimes exhibit impatience at her close confinement, and want to get frequently off the nest. When this is observed, M. Parmentier directs one half of the food that usually forms her meal to be withheld, and when she has only had half of her due allowance, to replace her on the nest, and hold out to her in the hand some hemp or millet seed. This second meal has the effect of reconciling her to sit constantly without deserting her eggs.

With the same view, others put food and water so near the nest that the sitting hen may feed without leaving her eggs for any great length of time. But Sketchley well remarks, that this is not so conducive to health as the more natural method of letting her

come off to enjoy good water and food at some little distance; and M. Parmentier says, it is important that sitting hens should have a little exercise, as well as that the eggs should be exposed to the circulation of air to carry off any stagnant vapour, which was proved by M. Réaumur's experiments to be so deleterious and destructive to the chicks still in the egg. We have ourselves remarked, that sitting hens are as fond of rubbing themselves in the dust, as they are of food and water, and we have always indulged them, evidently with benefit, in this habit.

Other hens will sit so closely and long, that they are in danger of starving themselves for want of food. Mr. Lawrence says, he has had hens of this kind faint outright, as if dead; and which, when the chickens were hatched, were so exhausted, as scarcely to be able to attend to them. He recommends such hens to be fed on the nest.

When a sitting hen is found to break and eat her eggs, a trick by no means uncommon, it has been recommended as a remedy, to boil an egg hard, bore several holes in it, and give it to her while it is hot. The holes by showing the contents, tempt her to peck the egg, but she infallibly burns herself in the attempt, and will not any more attempt to peck any eggs; for the same reason, says M. Parmentier, that a scalded cat is afraid of cold water. Others put a stone or chalk egg in the nest for the hen to peck; but when a hen has once been found to eat her own eggs, it is generally best to fatten her as soon as possible for the table; as

she will never be worth anything again for either laying or sitting.

The changes which the egg undergoes in hatching from the first day till its final exclusion, which are particularly interesting, and have furnished a curious sub-

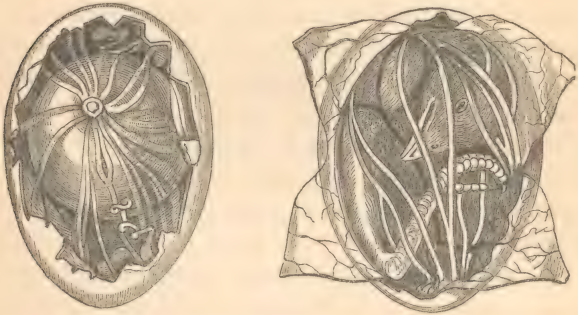


Fig. 13.—First and last Stages of Incubation.

ject of observation for naturalists and philosophers, may be shortly described as follows:

The hen has scarcely sitten on the egg for twelve hours, before traces of the head and body of the chick may be observed.

At the end of the second day, it assumes the form of a horse-shoe, but no red blood as yet is seen.

At the fiftieth hour, two vesicles of blood, the rudiments of the heart, may be distinguished, one resembling a noose folded down on itself, and pulsating distinctly.

At the end of seventy hours, the wings may be seen ;

and in the head, the brain and the bill in form of bubbles.

Towards the end of the fourth day, the heart is more completely formed; and on the fifth day, the liver is observable.

At the end of a hundred and thirty hours, the first voluntary motion may be observed; in seven hours more, the lungs and stomach appear; and in four hours after this, the intestines, the loins, and the upper jaw.

At the end of the hundred and forty-fourth hour, two drops of blood are observable in the heart, which is also farther developed.

On the seventh day, the brain exhibits some consistence.

At the hundred and ninetieth hour, the bill opens, and the muscular flesh appears on the breast; in four hours more, the breast-bone is seen; and in six hours after this, the ribs may be observed forming from the back.

At the end of 236 hours, the bill assumes a green colour, and if the chick be taken out of the egg, it will visibly move.

At 264 hours, the eyes appear; at 288 hours, the ribs are perfect; and at 331 hours, the spleen approaches near to the stomach, and the lungs to the chest.

At the end of 355 hours, the bill frequently opens and shuts.

At the end of the 18th day, the first cry of the chicken is heard; and it gradually acquires more strength, till

it is enabled, as we shall presently see, to release itself from confinement.

Some people, upon the eleventh or twelfth day, examine the eggs which have been sitten upon, to pick out the bad ones. With this view they place the eggs on a drum, or between the hands, in the sunshine, and observe the shadow. If this wavers, by the motion of the chick, the eggs are good, if the shadow shows no motion they throw them away.

Exclusion of the Chick.

About the 21st day, the chick is excluded from the egg, whose shell is not broken by the hen, as is sometimes ignorantly asserted, but by the chick itself, in a highly interesting process, first investigated by M. Réaumur, though it was known to Albertus Magnus in the thirteenth century.



Fig. 14.—Position of the chick immediately before hatching, and of the situation of the bill in the act of chipping the egg.

For the purpose of breaking the shell, the chick is furnished with a horny-pointed scale, greatly harder than the bill itself, at the upper tip of the bill—a scale which falls off after the chick is two or three days old. The chick is rolled up in the egg in the form of a ball, with its fore part towards the biggest end, and its beak uppermost, with the hard scale nearly touching the shell.

A short time before exclusion, M. Réaumur could hear the chicks hammering upon the shell with their beaks, and as they made progress, he could see them actually at work through the translucent membrane. The first few strokes of the chick's beak produce a small crack, rather nearer the larger than the smaller end of the egg, when the egg is said to be chipped. From the first crack, the chick turns gradually round, from left to right, chipping the shell as it turns, in a circular manner, never obliquely.

All chicks do not succeed in producing this result in the same time, some being able to perform the task within an hour, others taking two or three hours, while half-a-day is most usually employed, and some require twenty-four hours or more, rarely two days.

Some chicks begin to break the shell too soon, that is, before they have taken in the necessary provision of food, by the yolk passing into their bodies through the navel-string. The chick, indeed, which comes out of the shell before the yolk is thus taken up, is as certain to droop and die as a calf would do without milk.

Some chicks, it may be remarked, have greater ob-

stacles to overcome than others, from all shells not being alike in thickness and hardness; and hence the directions given for assisting in the process. Mascall, for example, says—"When the chickens are heard to piepe in the shell, and cannot come forth by hardnesse thereof, then must ye help the henne and break the toppe of the shell: ye must break it that the head of the chicke may come forth, so shall ye use all those that have hard shells." (*Husbandlie Ordering*, c. 5.)

It is the practice, in some countries, to dip the eggs in warm water at the time they are expected to chip, on the supposition that the shell is thereby rendered more brittle, and the labour of the chick lightened. But M. Réaumur found upon trial, that even boiling water does not render the shell more brittle; and though the water should soften it, upon being dried again in the air it would become as hard as at first. The shell, however, is rendered more brittle by the process of hatching, for it loses, on an average, eight grains a day by evaporation and absorption. (*Yarrell in Zool. Journ.* ii. 436.)

Other chicks, again, though sufficiently strong, and inclosed in a shell of the usual thickness, are unable to make their way out, even when a breach in the shell is made for them, in consequence of some unknown cause depriving them of the power of turning on their own bodies, and by remaining in the same position, they become glued to the shell.

To be sensible how a chicken may be glued to the shell, and how this is brought about, we must recollect,

that between the membrane and the body, there remains a clammy fluid of the white of the egg ; which, by drying, becomes a real glue, very apt to cause the feathers to adhere to the membrane they touch. The chicken of an egg, in which that fluid has been more thickened by an intense heat, is in greater danger of being thus glued to the shell by the feathers : though this accident does not generally happen till after having made a pretty wide fracture in the place that was first pecked, he has rent the membrane in that very place, and then has remained at rest a good while. The air that was introduced into the cavity of the shell through the fissure, has directly changed into a dry hard glue the liquor that was next the margin of the aperture, and that of some other parts within ; afterwards, when the chicken would return to his work, he may use his bill indeed, but he no longer can make his body move : the attempts he makes towards it are painful to him ; they are apt to tear his feathers, and force him to squeak : he has no longer any desire to repeat the same trials, and when he happens to reiterate them, they expose him to new pains, and are as little successful as the first.

The signs that a chicken is in this condition, in which he needs must die, if not assisted, are, when a large fracture that has been made in a shell, together with a rending of the membrane, remains the same for five or six hours, and is not enlarged. It may be concluded from this, that the chicken adheres to the inside of the egg. If we look with attention on the margin of the

hole made in the membrane, we shall see it dry, no fluid appearing to moisten it, and it will even sometimes be apparently covered with feathers sticking to it. We must not hesitate in that case to do for the chicken what he would infallibly do were he not deprived of all liberty of acting: by many gentle strokes of a hard body, as for instance of the end of a key, we may lengthen the fracture till the whole circumference is completed, and then tear the membrane which is under the fracture: this may be done with a small point, as for instance of a pin or a pair of scissors, but we must take the utmost care not to let it penetrate into the cavity of the egg any further than is necessary to effect the intended rent. We may often, without any danger to the chicken, tear the membrane round the whole circumference of the egg, with the nails or with the fingers, by making the gentlest efforts to take off the fore-part of the shell, which is already separated from the other by the fracture; the membrane that sticks to it is torn by the efforts thus made against it. But generally we ought not to attempt to break off all at once the whole fore-part of the shell; and the resistance experienced in that case is a sufficient warning that we cannot do it without causing an excessive pain to the chicken. When the resistance proves too great, we must break the fore-part of the shell into many pieces, which must be separated gently from each other afterwards, so that the chicken may be quite open. Among those pieces of shell, there are some that must be taken off with great care, namely, those which cannot be pulled without

making the chicken squeak, and to which his feathers are glued ; and these must be gently touched with the tip of a feather, or a small painting brush dipped in hot water. If great care be not taken, the feathers will be torn off ; but most commonly the feathers themselves tear off the shell the part of the membrane to which they adhere. After the chicken has been thus freed from all the parts of the shell, there remain upon his body several flat scales of varying width, which are so many pieces of the membrane still adhering to the feathers. This spoils his coat for two or three days only, at the end of which those membranous scales fall of their own accord. It happens, sometimes, that the chicken adheres not only to several places of the fore-part of the shell, but also to many places of the hind-part, from which he must likewise be separated.

This operation, though very painful to the chicken, yet is not mortal to him : he no sooner gets rid of it, than he appears to have as much vigour as any new-born chicken ; but it is in the power of the person that saves his life to save him the pain also ; he needs but moisten, with the corner of a piece of linen dipped in warm water, the places where the feathers adhere to the membrane the shell is lined with, which done, he may unglue them without any danger of tearing them off the body, or of rending fragments of the membrane.

The chickens which have their feathers glued to the inward surface of the membrane, are not the only ones whose life may be saved by our helping their hatching : there are some, as we have already said, that cannot

arrive at breaking through their shell for want of strength, or from having too powerful obstacles to conquer. This must be judged to be the case of the chicken in any egg that remains pecked for above half-a-day, or for a whole day together, without any further extension of the crack to the right, and without any renting, or even any uncovering, of the membrane. In that case we do him a kind piece of service to cause him to be hatched, and we do it too without giving him any pain. After having fractured the shell all round its circumference, and torn the membrane, we shall find no difficulty in taking off the fore-part of the shell. If this help does not come too late, the chicken is no sooner exposed to the open air, but he pulls his head from under his wing, stretches out his neck, and most commonly is not long without making the necessary efforts to come out of the portion of the shell which he still is in.

This assistance, which is so important to many chickens, might prove fatal to others; for which reason we would advise the reader not to attempt it in too great a hurry. Our opinion is, that the facility of coming out of their shells, ought not to be procured to any but those which have been nearly four-and-twenty hours, after their first attempt to break out, without getting forward in their work.

Food of the Newly-hatched Chick.

During the process of hatching, the yolk of the egg increases in quantity, at the expense of the white, whose

fluid part it absorbs, and it thence becomes a salutary milk, which is conveyed to the liver, is elaborated there, and afterwards passes into the circulation. Till the nineteenth day of incubation, the yolk forms in the egg a distinct body from the bird inclosed in a separate membranous bag, and there is only a communication between them, by means of the vessels, which serve instead of the navel-string of quadrupeds. But at that time it enters entirely into the belly of the chicken, and by its presence so much increases its size, that the bag has no longer a sufficient capacity for holding it ; it breaks, and the lungs are brought into contact with the air which has penetrated into the egg, to fill up the vacancy occasioned by evaporation. The chicken breathes, and chirps, his vital force acquires more energy, he moves his limbs, his bill works, his shell is broken, and he is excluded. The day of their exclusion, chickens do not want to eat, but are left in the nest. They may the next day be put under a coop, or large basket, lined inside with tow, and fed, as on the following days, with crumbs of bread, soaked either in wine, to strengthen them, or in milk, to give them an appetite ; and if they mute loose, the yolks of hard-boiled eggs may be given them. Very clear water must be set for them fresh every day, and now and then they may have some chopped leeks. After having kept them cooped up warmly under this basket, during five or six days, they may be turned out a little in the sun, towards the middle of the day, and fed with boiled barley, mixed with curds, and a few pot-herbs chopped up. The hen is generally kept under a coop

for some days after the chickens are first let out, lest she should take them too far, and tire them.

At the end of fifteen or eighteen days, the hen may be allowed to lead her little ones into the poultry-yard ; but as she is then, according to some, able to manage twenty-five or thirty chickens, some writers advise that those of another hen may be added to hers, and the other hen may be put back again to hatch or lay.

The characters by which one of these hens may be chosen in preference to the other, for giving her the management of her chickens, are a full-sized breast, and a great compass of wings, in order that the chickens may be gathered together by the hen under her, and thus kept from unhealthy chills.

The tenderness and solicitude of the hen for her little ones, and the alteration which maternal love has produced in her temper and her habits, are really worthy of admiration. Previously she was ravenous, insatiable, vagrant, and timid ; but as soon as she becomes a mother, she becomes frugal, generous, courageous, and intrepid ; she assumes indeed all the qualities that distinguish the cock, and even carries them to a higher degree of perfection. When we see her come into the poultry-yard, surrounded by her little ones, for the first time, it seems as if she was proud of her new dignity, and took a pleasure in performing her duty. Her eyes are lively, animated, and constantly on the alert ; her looks are so quick and rapid, that she could take in every object at one glance ; and she appears to discover at once the smallest seed on the ground, which she

points out to her young ones ; and in the clouds, the bird of prey she dreads for their sake, and giving them notice by a doleful cry, she induces them immediately to hide themselves, under her protecting wings.

Incessantly taken up with the welfare of her chickens, she excites them to follow her, and to eat ; she picks their food ; she scratches the ground in search of worms, which she gives up to them ; she stops now and then, she squats down, and forming a cradle as it were with her wings, she invites her tender offspring to come and gather round, and warm themselves beneath her. She continues to bestow these cares on them till they are of no further use to them, which takes place when the chickens are quite feathered, and when they are come to half the size they are to grow to.

Out of these young ones, come to this size, the finest hens are kept for replacing the old hens ; the stoutest cocks are also kept for succeeding those that are becoming too old ; and the rest are either sold at market, or fattened for the table.

It is not easy to estimate the cost of bringing up chickens, for though their daily consumption at first is so very small that it can hardly be calculated, yet it increases with their age. The newly-hatched chicken has a crop, which may be filled with a quantity of food no bigger than a pea ; at the end of a few weeks, his crop will contain a quantity of food no bigger than a cherry ; and he is come to being eatable when the capacity of his crop is such as would hold a walnut. The crop of a hen crammed with corn is bigger than a

common apple. It is these variations in the capacity of the crop, or, which is the same thing, in the quantity of food digested every day, which render the estimate of what the chicken costs, till it is fit for the table, difficult.

Supposing the chicken to be fed with the same diet as the hen, if we knew the proportion of his consumption of food till he is three months old, to the consumption of a hen during the same time, what he costs for his food might be estimated exactly enough : we ought to judge at least that what he consumes in food is but a very small portion of what the other eats, and that therefore the bringing up of the chickens costs but a small part of that of a hen. It must needs be so, since the experiments repeated during a long series of years, have not informed the country people, that they were at all losers by selling their chickens at so small a price, since, in short, they have not taught them that they would be greater gainers by selling the eggs than by causing chickens to be hatched from them. The truth is, that these chickens live in the country after the same manner as the hens that lead them ; and that it is only during a few weeks, that corn is distributed among them at several hours a day.

Artificial Hatching.

The first notices which we have of hatching chickens artificially, without the aid of hens, are to be found in Democritus (*Geoponica*,) Aristotle, Diodorus, and Pliny. The latter mentions, that the Roman empress Livia

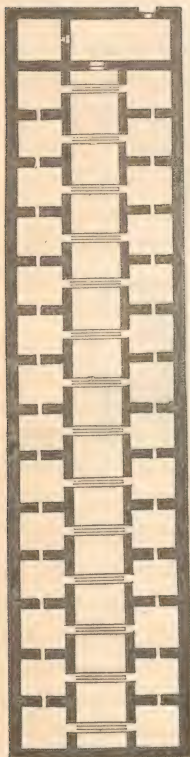
hatched an egg by carrying it about in her "warne bosome," and this probably gave origin to "the device of late to lay egges in some warne place, and to make a gentle fire underneath of small straw or light chaffe, to give a kind of moderate heate; but evermore the egges must be turned by man or woman's hand both night and day, and so at the set time they looked for chickens and had them."—(*Holland's Plinie*, b. x. p. 55.)

The art has been extensively practised in China and Egypt from an unknown period of time. Mr. Barrow says that it is even practised by the Chinese families who live constantly upon the water. They deposit the eggs in sand, at the bottom of wooden boxes, placed on iron plates and kept moderately heated. The Egyptian method is different, as we shall presently see.

Egyptian Method.—The knowledge of the art of artificial hatching is confined to the inhabitants of the village of Berme and a few adjacent places in the Delta, who travel about the country to perform the process at the proper season. The number of *mamals*, or hatching ovens, was in the beginning of the last century 386, and the number of eggs hatched in each is reported to be from 40,000 to 80,000, and the Bermese, who conducts the process, is obliged to return two chickens for every three eggs entrusted to him. Dr. Graves says 200lbs. weight of litter, or the dung of cattle, are daily consumed in heating the mamals.—(*Phil. Trans.* No. 117.)

According to Niebuhr, the art is greatly on the de-

cine; but he must surely be mistaken in stating, that there are now no mamals, except those of Cairo belonging to the Pasha; and that the number of chickens hatched is not considerable.—(*Travels*, p. 92, English edit.)



The hatching oven or mamal is built with brick, about nine feet high, with a gallery in the middle, three feet wide and eight feet high; on each side of which is a double row of rooms, each three feet wide, four or five feet broad, and twelve or fifteen feet long, and each capable of containing four or five thousand eggs, deposited in such a manner, according to Brown, (*Travels in Africa*, p. 77,) as not to touch one another, upon a mat or a bed of flax.

At the outside of one angle of the building there is a fire-place, from which the heat is conveyed to both stories by means of flues, during three or four hours daily, at stated intervals. Ventilators are also used, lest the heat should be too great,—the standard of temperature being that of the warm baths of the country. After ten days, ascertained by holding an egg or so to the eye, according to the weather, the fires are discontinued, the oven being

Fig. 15.—Egyptian Egg Oven, Ground Plan.

then hot enough to complete the process. About the middle of January the ovens are inspected and repaired ; and, as they are public, and as each has a circuit of fifteen or twenty villages, notice is given to the inhabitants, so as they may come and bring their eggs.

As soon as a suitable quantity of eggs is collected together, they are put into the rooms that are to serve for the first brood ; for the whole of the ovens are never employed at once on the same brood, but only one-half of those which the building contains.

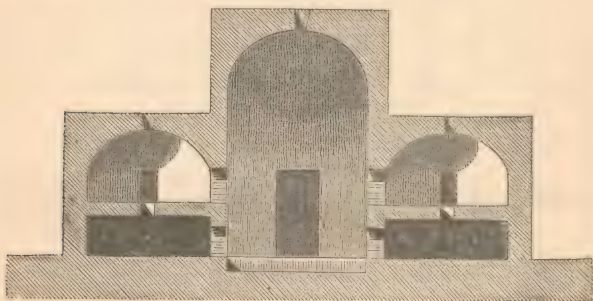


Fig. 16.—Second Section.

The eggs are ranged three deep in the lower rooms of each oven, on a bed of chopped straw and dust, which mixture Aristotle probably mistook for dung. As the fuel burns away, it is renewed two or three times a day, and as many at night, with the same precaution each time to unstop for a moment the hole in the roof, both for the purpose of refreshing the air, and for keeping the eggs from the first impression of heat. The fire is thus continued during ten days ; a long experience, a

skilful hand, and the application of the eggs against the eyebrows, are the only thermometers used in Egypt for regulating the temperature.

During that space of time, the eggs are often turned and examined, and those that are stale or clear are thrown aside.

On the eleventh day, the second brood is forwarded by placing fresh eggs in the inferior cells of the six ovens left empty at the first brood, and the furrows of their upper cells are filled with lighted fuel.

As soon as the fire is lighted in these ovens, it is put out in the others, so that the eggs of the latter are no longer heated, but by the fire lately made in the former, and only receive heat by the side windows in the upper chambers of the ovens, which remain constantly open.

The second brood thus got forward, they take from the lower rooms of the ovens first used, one-half of the eggs, to lay them out on the floor of the upper rooms. This change is made, because these eggs require the greater care the nearer they draw to the time when the chickens are to issue from them; they may be inspected, turned, and taken up with greater ease.

When the twentieth day of incubation is arrived, some chickens are already seen breaking their shell, the greater part issue on the morrow, with or without help; but few wait for the twenty-second day.

The strongest chickens are taken to the room allotted for receiving them, to be distributed to those who have furnished the eggs, and who obtain two chickens for

every three eggs ; the weakest are kept for a few days longer.

On the revival of arts in Europe, the Egyptian method spread successively to Malta, to Sicily, to Italy, and thence to France and England. One of the dukes of Florence sent to Egypt for a Bermian to superintend a hatching-oven for him ; and Alphonsus II., of Naples, set up one at his country residence. Charles VIII., of France, in 1496, had one built at Amboise, and Francis I. another at Montrichard. There is a curious entry extant of the expenses of the oven at Amboise, which runs thus :—

“ Paid to Messer Nicolas Vicens, an Italian, for fourteen days by him taken and employed for working an oven at the said palace of Amboise, for hatching and rearing chickens without hens ; which he has done for the king’s pleasure, during this time, at the rate of four sols two deniers per day, and has been paid, as appears by his receipt, the sum of fifty-eight sols four deniers (about five shillings).

“ To the said, the number of 1,300 eggs by him bought at the aforesaid time in order to have them hatched and to have chickens for the said, at the rate of four sols two deniers per hundred.”

Olivier de Serres, the father of French agriculture, describes a little portable oven, of iron or copper, in which eggs were arranged and surrounded with feathers, and covered with soft cushions, heat having been communicated by means of four lamps, but, he says, it was more curious than useful. (*Théâtre d’Agriculture.*)

Réaumur’s Methods.—Misled by some inaccuracy in

a passage in Aristotle, who says the Egyptians cover eggs with dung, in order to hatch chickens—a circumstance quite impossible, M. Réaumur tried various experiments in hatching artificially by means of heat, generated from fermenting dung, and after numerous disappointments, at length succeeded in hatching about two-thirds of the eggs which he tried.

A similar plan was tried in England by Bradley, and by Darby, a gardener at Hoxton. Bradley tells us, he made a hot-bed, either of dung or tanner's bark, into which he plunged a vessel like a garden pot, but not quite so deep, filled half way with cotton or wool, on which the eggs were placed, and covered with four inches of more wool. These pots when plunged in the hot-bed were covered with a glazed frame, such as is used for cucumbers, and no further attention seems to have been paid till the chickens were hatched. (*Country Gents. Director*, p. 32.)

Not satisfied with dung as a generator of heat, M. Réaumur tried the fire heat of a baker's oven. A small carriage on wheels was constructed, in which were several drawers for containing rows of eggs, which could be moved and examined at pleasure, in a chamber placed over a bread oven. But where there is not the convenience of a bread oven, a hatching-oven might be constructed with a stove in it to communicate heat. M. Réaumur was so successful in these experiments, that he was of opinion it might be advantageous, in point of economy, to introduce this latter method extensively. He says, the proper temperature may be ascertained,

even without a thermometer, by melting together in a phial, a piece of butter as large as a walnut, with half as much tallow: when it flows like a thick syrup on inclining the phial, it indicates the proper heat. (*L'Art de faire éclore.*)

M. Dubois' Method.—This is an improvement upon M. Réaumur's suggestion of the stove, and is both easy and not expensive. Below a chamber ten feet by ten with a low ceiling, and a door covered with old tapestry, M. Dubois places a metal stove with a pipe rising perpendicularly into the chamber to heat it. He burns balls of clay kneaded up with small coal, a sort of fuel common on the Continent, and two pounds of coal added every five or six hours was found sufficient to keep up the proper temperature, which is ascertained by several thermometers. The eggs are placed in osier baskets, suspended from hooks in the ceiling, each basket being dated on the day it is hung up. At the end of four or five days (but this is rather too soon) the bad eggs are removed. Having found that, towards the twelfth or fifteenth day of incubation, it is better to diminish the heat, M. Dubois lengthens the cords which suspend the baskets, so as to bring them nearer the floor of the chamber, where it is not so hot. He also moves the eggs daily so as to regulate their heat. It is not said whether this method has been much tried. (*Dict. d'Hist. Naturelle, POULE.*)

M. Copineau's Method.—Instead of the dry heat of a stove or oven, M. Copineau makes use of hot water carried in a pipe along the floor of a chamber con-

structed for hatching. He has also pipes or flues for the purpose of ventilation and regulating the heat, while he places vessels of water in the chamber to render the air equally moist with that under a sitting hen. (*L'Homme Rivale de la Nature.*)

Artificial Ornithotrophy.—An anonymous French author has improved upon M. Bonnemain's method. His first trials were with a model of a circular earthenware oven, arched above, twenty-eight inches high by twenty-four inches in diameter, and an inch thick at the sides. This oven had several ventilating holes of an inch in diameter, and furnished with cork stoppers for regulating the heat. The oven was closely luted to a table, under which was a cylinder of hot water, with a pipe rising through the table into the oven, and a grated fire-place underneath. The eggs were deposited on cards or small shelves, three or four inches in breadth, ranged around the interior so as to contain about 300 eggs. The inventor not having been very successful in his trials with his model, built a brick structure seven feet high, of similar proportions with the model, and tried about eight different broods in it, of from two to three thousand each. He confesses, however, that he did not average above one chicken from six eggs.—(*Ornithotrophie Artificielle.*)

M. Bonnemain's Method.—Drawers on shelves similar to those of M. Réaumur, lined with woollen cloth, and supported by cross wooden bars, with a small leaden tub, full of water, are placed in a chamber twelve feet by ten, and six feet high. The drawers are calculated to

contain ten thousand eggs, and above each row of drawers, pipes full of hot water run along in such a manner, that the water may return to the cylindrical boiler after heating the eggs.

He manages the eggs by turning, and by examining them to reject the bad ones, as we have seen to be done in other instances. The advantages of this method, M. Parmentier thinks, are, that the heat is rendered infinitely more constant by the regulator, adjusted to a side door placed lower than the grate of the furnace ; that the damp heat is more perfectly similar to that of a sitting hen ; that the application of the heat is also more naturally managed ; and that from the liquids in the egg not being so much exhausted by evaporation, the chickens more readily free themselves from the shell at the period of their exclusion.

English Methods of Hatching by Steam.—The following somewhat clumsy method is mentioned by Lawrence as having been tried by him. He wrapped a number of eggs in wool, put them in a wicker basket covered with flannel, and suspended this over a chafing-dish of charcoal in a chimney where there was no other fire, the chimney skreen being constantly kept fast to concentrate the heat. The degree of heat was judged of, every three or four hours, by the feelings, and the eggs were constantly turned and transferred from the centre to the circumference of the basket. About thirty or forty healthy chickens were on a second trial obtained from about forty-five eggs, the first trial having been unsuccessful. (*Mowbray*, p. 46.)

Some years afterwards a method similar to that of M. Bonnemain was exhibited in London, at the Egyptian Hall, in Piccadilly; and in 1839 was shown the celebrated Eccaleobion, which was visited by an immense number of persons. This establishment was in a large room in Pall Mall, and it consisted of a large hatching oven, which extended along one side of the room, with an inclosure of similar size on the other for the chickens; while at the bottom of the room was a glass case, in which the chickens were put when first hatched, and in the centre a saucer, with eggs broken, in different states of advancement, in order to show the process of incubation. The oven was divided into eight compartments, each of which was furnished with a glass; and each contained a shallow box lined with cloth, and the bottom covered with two or three hundred eggs, laid carefully, so as not to touch each other. The boxes were heated with steam pipes, and a jug of water was placed in each to ensure a moist atmosphere. In each box the eggs were in a different state of advancement; the object being to have several chickens hatched every day, in order to gratify the curiosity of the numerous visitors of the establishment. The chickens, as soon as they were hatched, were put under the glass case at the end of the room till they were two or three days old; after which they were removed to the inclosure opposite the oven. This inclosure consisted of a platform with a railing round it, and a row of coops for the chickens to run into, and boxes for them to sleep in at the back. Here they ran about, picking up bruised grits and other food all

day ; and at six o'clock in the evening they were put to bed, twelve together, in the boxes behind the inclosure—the boxes being lined with flannel, and having a flannel curtain in front. The chickens, when three weeks old, were sent to market, and sold at about a shilling each. The eggs were bought in the common markets, and nearly half proved addle ; but the chickens were very healthy, and not more than one in fifty died after they had left the egg. The name of the proprietor of this establishment was Mr. William Bucknell.

Artificial Rearing of Chickens.

It is by no means so difficult to succeed in hatching chickens artificially as to rear them when they have been hatched. When tender song-birds, such as nightingales or goldfinches, are taken from their mothers, as is frequently done before they are fledged, experience proves, that in rearing them successfully, warmth is no less indispensable than food, and exposure to cold during the night will frequently kill the most healthy nestlings. The mother birds, instinctively aware of this, are equally assiduous in covering their chicks after they are hatched, as they had previously been while sitting on the eggs.

When the newly-hatched chickens begin to run about, as they do almost immediately after they are hatched, the mother hen has no little trouble in sheltering them from cold, and even during the hottest weather, from rain, which, as we shall see in treating of the disorders of poultry, proves very injurious, in consequence of the cold produced by evaporation of the moisture. How-

ever much, also, we may admire the ingenuity of birds in some things, and their anxious affection for their young, yet they exhibit, in other instances, great apparent stupidity ; for maternal affection, so far from sharpening their faculties, seems, at first, rather to blind them, and to cause them to injure, and even to kill some of their chickens through awkwardness, or inconsideration.

For example, out of over-anxiety to have her chickens near her, a hen will not unfrequently set her foot upon some of them, so as to crush or mortally injure them ; and the same accident often happens by her sitting over them with her body to keep them warm. Again, in scratching to procure them food, she seems quite heedless where she strikes with her foot, and I have observed in several instances that she kicked the chickens behind her, and laid them sprawling on the ground.

Independently, however, of such accidents as these, no hen, whatever may be her care, can prevent her brood from often passing through great changes of temperature. She neither can nor ought to sit on them constantly, as they must eat and run about ; and in cold, or what is worse, in rainy weather, the damp ground must prove very injurious, even when she has them under her warm wings. Hence it is, that we frequently see a mother hen not able to rear above three or four out of a dozen or more which she may have hatched.

When we take all these circumstances into consideration, it must appear no easy task to rear the chickens which have been artificially hatched, without a mother-hen to attend to them afterwards.

In Egypt, according to the information procured by M. Boudet and Rouyer, who accompanied the French army of the East, almost as soon as the chicks have issued from their shells, they are taken from the hatching-ovens, and given back in flocks of four or five hundred, to the peasants who have furnished the eggs, and the care of them is entrusted to the women of the proprietors.

In that country, where it scarcely ever rains, the houses in the villages, instead of sloping roofs, have terraces or flat roofs, with parapet walls around them, four or five feet high. In the inclosure thus formed, a fine layer of mould is spread, and the chicks turned in, corn, millet, and bruised rice being given them for food, while they are carefully watched, lest they be pounced upon by kites, hawks, or other birds of prey.

As the dews in Egypt are almost as wetting as our drizzling rains, the chickens require to be carefully sheltered at night, and accordingly, towards evening, they are put into coops made of palm-tree branches, and lined with coarse cloth, which are taken down from the roofs into the houses.

About a month of this nursing renders the chickens strong enough to be turned into the poultry-yards, among the full-grown fowls.

In the colder and moister climate of Europe, it must be obvious that the Egyptian mode would not succeed, and accordingly in the first trials it was attempted to get mothers to rear the chickens. Several facts upon record suggested the notion of not employing hens,

(whose laying of eggs would be thereby obstructed) but cocks, or rather capons.

Trained Capons.

It had been remarked ages ago by Aristotle, (*Hist. Anim.* ix. 49,) that on a mother-hen having been killed by accident, a cock assumed the office of a parent, and reared the brood. Albertus Magnus witnessed a similar case; and Ælian even mentions a cock which, on the death of a hatching-hen, sat on the eggs and reared the chickens.—(*Aldrovand. Ornithol.* ii. 107.) Our distinguished English naturalist Willoughby tells us, that he himself “ beheld more than once, not without pleasure and admiration, a capon, bringing up a brood of chickens like a hen, clucking to them, feeding them, and brooding them under his wings, with as much care and tenderness as their dams are wont to do.”—(*Ornithology by Ray*, p. 156.)

As early as the sixteenth century, it would appear that capons were actually trained to bring up broods of chickens, not those which had been hatched artificially, but in order to let the mothers begin laying again. The method of training a capon for this purpose was, towards evening, to pluck the feathers from the breast, to irritate the bare skin by rubbing it with nettles, or horse-radish steeped in vinegar, and then to put the chickens to him. The little things of course will naturally huddle under him, and by rubbing their heads on his belly will tend to allay the irritation and itching caused by the nettles. By repeating this for two or three successive nights, the capon will acquire an affection for the chickens, and

attend to them like a mother. It may probably be on the principle of mutual distress producing mutual sympathy, that the querulous chirp of the chickens may make him, while uneasy himself, desirous of allaying their uneasiness. When once accustomed to attend to a brood of chickens, a capon will not abandon the duty, but as soon as one brood is grown up, may have another brood put to him, to which he will be as kind and attentive as to the first.—(*Baptista Porta, Magia Naturalis*, iv. 26.)

M. Réaumur says he had repeated opportunities of convincing himself by personal observation, that capons perform the office of a mother very well. “A lady related to me,” he says, “has a vast number of chickens brought up every year with no other nurses than capons; and I have seen frequently, at her chateau of Vaujour, near Livry, about two hundred chickens, that had only three or four capons for their leaders; it being one of the advantages of this method, that a capon may be trusted with two or three times as many chickens as a hen can properly manage. Another advantage is, that a capon may be set to nurse at any given time, as he is always ready to undertake his task; and he even seems to become proud of his family in proportion as the number increases; whereas hens will persecute and drive away the chickens which are offered to them after a certain age, and which are of course different in size from those they have themselves hatched.”—(*L'Art de faire éclore*, *Mém.* vii.)

Besides the cruel method of training a capon, prac-

tised in the sixteenth century, others advise making him tipsy with wine or brandy, in order, as they profess, to make him fancy himself a hen when the chickens are put to him, and he sees them crowding about him ; but upon trying this, M. Réaumur found, that, in a number of instances, the capon, instead of attending to the chickens, trod upon and crushed several of them to death, while he gave others a drubbing with his beak.

Accordingly, being convinced that such empirical practices were useless, he put three capons under the care of the woman who had the care of the poultry-yard at the Château de Vaujour ; and as she proceeded on a regular and rational plan of training, put in force, not for a single night or day, but continued for several days in succession, the capons came out of her school very well trained in about ten or twelve days.

The method of this woman was neither to make the capons drunk, nor to pluck their feathers and sting them with nettles. She kept them solitary for a day or two, in buckets somewhat deep and narrow, darkened by a covering of boards, from which they were taken out twice a day to feed. As soon as the capon was in this way rendered weary of solitude, she placed with him, as companions, two or three chickens somewhat advanced in growth, giving them all their food in company. If he chanced to ill-use the chickens, as sometimes happened, they were removed for some days more, and others were put to him.

Old Mascall does not seem to think any training necessary. "When the capons," he says, "are a year or

and a halfe olde, there is no more disposition or ranknesse in them ; then ye may choose, and take the fairest and greatest, to govern and leade your chickens, although there is not so great stoutnesse in him as in a cocke." (C. 23.)

By varying such means, according as circumstances indicate, a capon will be brought to contract a habit of living amicably with two or three chickens ; and the number being increased by degrees, he will at last begin to take a pride in his flock, so that it may be enlarged to any extent. In these circumstances, upon being liberated from confinement, he will brood over the chicks as a hen does, whenever they require to be protected from cold, and will lead them to places where they may find food, clucking like a hen when they straggle, to call them together. Nay, he will redouble his clucking when he finds such dainties as a piece of bread or an earthworm, which he will divide into several small portions to share among them all, and will appear to be delighted to see them eat heartily of what he deprives himself for their sakes.

As soon as a capon gets over the few first days of training, during which he may probably injure or kill two or three chickens, the task becomes easy. When once he has been taught, also, he will retain, as well as the nettle-stung ones do, the habit of tending chickens to the end of his life, without ever becoming tired of the duty ; and even though kept unemployed for several of the winter months, he will take to it as well as before the ensuing spring.—(*L'Art de faire éclore.*)

The capon, which becomes a leader of chickens, M. Parmentier tells us, appears in the poultry-yard at their head, not as he was before training, dull, ashamed, and humbled, but proud, haughty, and triumphant; and such is the influence of audaciousness over all animals, that this assumed air imposes so powerfully on the fowls, as to prevent them from disturbing him in the performance of his duty. At first, indeed, he is rather awkward: the desire he manifests to exhibit in his bearing the dignity and majesty of the cock, makes him hold his head too high and too stiff, while he does not see the chickens crowding about him, and often, therefore, treads upon and injures them. Soon, however, he acquires more skill, and accidents of this kind become rare.

As the clucking of a capon is not supposed to be sufficient to call the chickens together and keep them about him, a small rattle has been devised to hang round his neck, to supply the deficiency.

Success with any new expedient, like that of training capons to nurse chickens, usually leads us, as misers are led to grasp at more gold, to derive other advantages not at first contemplated. Accordingly it was imagined, that capons might, like Ælian's cock, be taught to hatch eggs—and experiment proved that this also was possible. "After some preliminary preparations," says M. Parmentier, "analogous to those of training to bring up chickens, capons have been brought to sit on eggs, and this is so much the more advantageous, that from being considerably larger in size than a hen,

the capon can sit on as many as twenty-five eggs at once."

After hatching and bringing up one brood of chickens, the trained capon can be put on a fresh batch of eggs, and so on for two or three times successively. Should this practice ever come to be adopted to any extent, the hens might be left to lay all the year, except while moulting.

Although capons probably make the best nurses, it appears to be equally possible to train cocks to the duty. "I imagined," says M. Réaumur, "that I had sent to school three capons, but one of them proved to be a cock, and yet he came home as well trained as his two companions."

When artificial hatching is practised on large numbers of eggs, it must be frequently found impossible to procure a sufficient number of nurses, either of hens, capons, or cocks, to take charge of the chickens; and hence recourse must be had to other methods of rearing. The chief duties of a mother-hen, or a trained capon, are, to procure food and provide warmth, and these, with a little attention, may be supplied as well, or even better, by art, than by the most assiduous mother.

In the course of his very interesting experiments, M. Réaumur tried several plans for the substitution of what he aptly denominates an *artificial mother*. By bringing the chickens up in a hot-bed, indeed, it would be easy to make them enjoy a perpetual summer, exempt from all exposure to rain, or to cold nights. For the first fortnight or three weeks, they may even be advan-

tageously reared in the oven where they have been hatched, taking them out five or six times a day to

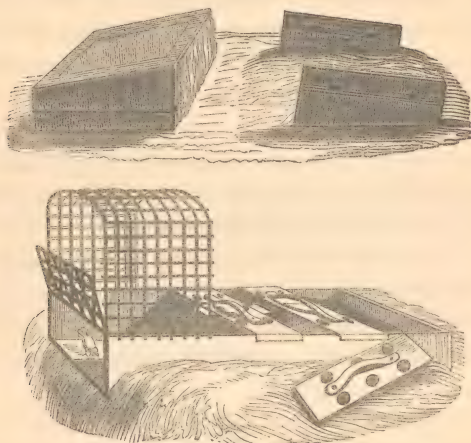


Fig. 17.—Réaumur's Artificial Mothers.

give them food and water ; but this is much more troublesome than there is any occasion for ; and some of the ingenious devices of Réaumur or Bonnemain may be adopted.

The former says—" My apparatus did not at first appear to be sufficiently perfect ; because, though the chickens were kept in warm air, they had no equivalent for the gentle pressure of the belly of the mother upon their backs, when she sits over them. Their back is, in fact, necessarily more warmed than the other parts of the body, while huddling under their mother's wings ; whereas their belly often rests the while on the cold

moist earth : the very reverse of what took place in my apparatus, in which the feet were the best warmed. The chickens themselves indicated that they were more in want of having their backs warmed than any other part of their body ; for, after all of them had repaired to the warmest end of the apparatus, instead of squatting, as they naturally do when they rest, they remained motionless, standing bolt upright upon their legs, with their backs turned towards the sides or end of the apartment, in order to procure the necessary warmth. I therefore judged that they wanted an apparatus which might, by resting on them, determine them to take the same attitude as they naturally assume under hens, and I contrived an inanimate mother that might supply, in this respect, the want of a living one."

The apparatus contrived by M. Réaumur, upon these principles, consisted of a box lined with sheep-skin, having the wool on it, the bottom of the box being of a square form, and the upper part of it sloped precisely like a writing-desk. The box thus constructed was placed at the end of a coop, or cage, shut in with a grating of osier, net, or wire, and closed above with a hinged lid, the whole being so formed that the chickens could walk round the sides, as shown in the cut above.

The desk-like slanting direction of the covering permitted the chickens to arrange themselves according to their several sizes ; but as they have, like all young birds, the habit of pressing very closely together, and even of climbing upon one another, the small and the weaker being therefore in danger of being crushed or

smothered, M. Réaumur constructed his artificial mother open at both ends, or, at most, with only a loose netting hanging over it. Through that the weakest chicken could escape, if it chanced to feel itself too much squeezed; and then, by going round to the other opening, it might find a less inconvenient neighbourhood.

One improvement upon this consists in keeping the covers sloped so low, as to prevent the chickens from climbing on the backs of each other, and raising it as they increase in growth. Another consists in dividing the larger coops into two by means of a transverse partition, so as to separate the chickens of different sizes.

"The chickens," says M. Réaumur, "soon showed me how much they felt the convenience of my artificial

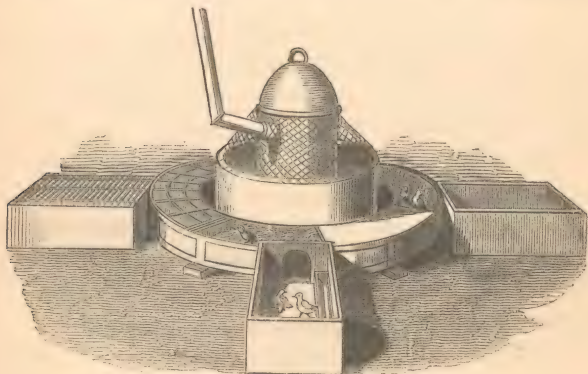


Fig. 18.—Réaumur's Hatching Apparatus.

mother, by their fondness for remaining under it and of pressing it closely. As soon as they had taken their

little meals, they were seen jumping and capering about ; and when they began to be weary, they crowded to this mother, going so far in that they were compelled to squat, as I perceived by the impressions of the backs of several chickens on the woolly lining, when the cover was turned up. No natural mother, indeed, can be so good for the chickens as the artificial one, and they are not long in discovering this—instinct being a quick and sure director. Chickens, indeed, direct from the hatching oven, from twelve to twenty-four hours after their escape from the shell, will begin to pick up and swallow small grains, or crumbs of bread ; and, after having eaten and walked about a little, they soon find their way to the fleecy lodge, where they can rest and warm themselves, remaining till hunger puts them again in motion. They all betake themselves to the artificial mother at night, and leave it exactly at daybreak, or when a lamp is brought into the place, so as to produce an artificial day-break, with which, it is worthy of remark, old hens are not affected, but remain immovable on their roosts.” —(*L'Art de faire éclore.*)

M. Bonnemain put the chickens hatched by his apparatus in a place where four pipes, fixed under boards, were made to run along at equal distances, a very little above the level of the ground. These pipes were filled with hot water, and had loose flannels attached to them, loaded with a light weight, so as to furnish for the chickens a soft body for warming, chiefly their backs.

In one or other of the houses thus warmed with hot water, M. Bonnemain's chickens were permitted to run

about or rest at pleasure ; while, in order to keep them clean, the floor was covered with a layer of fine gravel, which soaked up the dung, and was swept away every day. The artificial mothers were cleaned, the skins beaten, the wool combed, the chickens which were dirty washed in warm water, and the walls white-washed with lime, or lined with mats.

The following artificial mother is recommended by Mr. Young, under which, he says, five broods may be reared at the same time. "This mother may be framed of a board, ten inches broad and fifteen inches long, resting on two legs in front, two inches in height, and on two props behind, two inches also in height. The board must be perforated with many small gimlet holes for the escape of heated air, and lined with lamb's skin, dressed with the wool on, and the woolly side so as to come in contact with the chickens. Over three of these mothers, a wicker-basket is to be placed, for the protection of the chickens, four feet long, two feet broad, and fourteen inches high, with a lid open, a wooden sliding-bottom to draw out for cleaning, and a long narrow trough along the front, resting on two very low stools for holding the food. Perches are to be fixed on the basket, for the more advanced to roost on. A flannel curtain is to be placed in front at both ends of the mothers, for the chickens to run under, from which they soon learn to push outwards and inwards. These mothers, with the wicker-basket over them, are to be placed against a hot wall at the back of the kitchen fire, or any other warm situation, where

the heat shall not exceed 80° of Fahrenheit. When the chickens are a week old, they are to be carried with the mother to a grass-plat for feeding, and kept warm by a tin tube filled with hot water, which will continue sufficiently warm for about three hours, when the hot water is to be renewed. Towards the evening, the mothers are to be again placed against the hot wall." (*Annals of Agriculture.*)

It thus appears not difficult to hatch and rear chickens artificially, if due care be taken; efficient ventilation is above all necessary, for renewing the air; and for this purpose the pipe of the stove may be led into a kind of chimney, the lower opening of which, beginning on a level with the ceiling of the room, will present a good exit to the air it contains, while the fresh air from without may be duly warmed on its entrance, by bringing it through a reservoir in the stove.

Adjoining the place thus heated artificially, a little piece of ground should be appropriated for the chickens to go into occasionally, to accustom them to the natural air, till, when about six weeks old, or more, they can do without artificial heat and shelter.

FATTENING.

THE substance termed *fat*, in any sort of animal, does not form a necessary part of the body; but is only the superabundant nourishment which is not wanted for repairing the wear and waste of the bones, muscles, and other solids. Fat, accordingly, in a living

animal, has no more sensibility than the hair or the nails, and may, therefore, be cut into without giving the least pain, provided no other part besides the fat be injured. It is stowed up in membranous cells in various parts of the body, in readiness to be taken up by the absorbent vessels, and turned to use, whenever the supply of nourishment prepared by the stomach, and other organs of digestion, becomes deficient.

In order to make an animal fat, it is requisite that nourishment be supplied more plentifully than is wanted for ordinary nutrition, or, at least, more plentifully than the absorbent vessels can take up and dispose of. Consequently, if the activity of the absorbent vessels is diminished by any cause below its natural standard, fat must necessarily accumulate, till that activity be restored.

It follows, that a fat animal is not necessarily in a state of high health, if the absorbent vessels act feebly in taking up this fat; and it is indeed practically found, when an animal has been brought to a certain pitch of fattening, that disease often puts an end to the over-feeding which had, in the first instance, produced it. Fowls, as well as other animals, ought therefore to be preferred when they are moderately fat, rather than when they have been too much fed.

One principle upon which the absorbent vessels are rendered less active, consists in avoiding all stimulants and all exercise, even the stimulus of light, and the motions of the body, with everything that might produce irritation, or give uneasiness. Another principle

is, to load the stomach with the most nutritive food, provided it be bland, and without stimulus. It has been practically found that antimony, in its usual medicinal forms, has a great effect in producing fat; probably from its diminishing the activity of the absorbent vessels, and thence permitting the fat to accumulate undisturbed.

These general remarks will enable us to appreciate the various directions for fattening, which we shall now fully detail.

Mascall's Mode of Fattening.

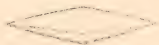
Chickens.—For the “fattening of bigge chickens,” says Mascall, “in the coope or penne,—they doe commonlye give them steeped breade in ale, sometimes of dry breade, and their drink, milke and water, or of soaked bran in milke; and sometimes ye must give them barley, and feed them one after another, if there be anything in their crops, for, if that which they have eaten is not gone or consumed, nor their craw yet emptie, that signifieth undigested and like not the meate, then give them no more till they have digested that. And for younger chickens, that goe yet with the damme, ye must not lette them go farre abroad, till they be strong, but lette them remayne with the henne in the house or penne, and give them oatmeale or barley meale till they be stronger. Ye must see to have them in temperate places, not too hote nor too colde, for they may not (being yong) endure muche heate or much colde, wherefore it were good to keepe them temperate

in the penne with the damme, fortye dayes, till they be more able to goe abroad. Ye must also clip the downe between their thighs, and under their rumpe, and see ofte unto them that their ventes may be issue."

Pullets.—"For the feeding and cramming of young pullets," continues he, "a verye good way is this to make them fat and tender to eate: ye shall keepe them in a dark place, or blind-fold them; then take barlye ground small, and sifte out all the branne thereof, then they doe use to moysten this barlye meale with warme milke; and some take ale, and some beare, so they cramme and feed them morning and evening, by giving them so much at once as they may well digest; and to helpe their digestion, some doe mixe with their meate of mustard seede, or anise-seedes. Thus ye may fat them in shorte space."

Hens.—"Because," he adds, "it is the common office of the countryman or woman to fat hens and poultrie, so likewise it is for the craftsman to buy—keepe—and sell them; and because it shall not be unmete for both sortes to feede them, ye shall understand ye must doe this: ye must prepare a warme place and darke, and put each henne by herselfe in a penne, made so narrowe that she cannot almost turne her therein, and those pennes must have on both sides two holes, the one to put forth her head, and the other her tayle and rumpe, and so to give her meate when she hath digested that in her craw, and to cleanse her penne ofte, that her dongue doe not hinder her fatting. Ye must also put cleane strawe under her, or softe haye of

the later season, for if they stand harde in the penne, they will scantily faste. Ye must place (cut) all the feathers on her heade and under her winges, and on her thighes; those of her heade and winges, because there shall come no lice to trouble her, the other feathers on her thighes, because the dongue shall not annoy and cumber her tuell. Her meate shall be barlye meale made in paste with water and fashioned into pellets longwaies, after this figure—



and so to make her to swallow them. The first day it shall be better to give her but little meate, until she be accustomed to digest it, for above all, yee must see that she digest her meate well, and give her no more, so long as she hath any meate in her croppe; and when she is filde, let her go a little without the penne, so that she go not farre. And thus ye may see the general rule how to fat hennes; and if ye will have them fatte and tender withall, yee muste kneade your barlye meale with water and honey, and that will fatte them and make them tender meat. Some doe put into three parts of water, one part of wyne or strong ale, and steep wheaten bread therein, and that will also fat as well—ye shall have her fatte about the twentieth daye. Also, in the meane time, if she doe refuse her meate, ye must then diminish or give her lesse so many days as ye have fed her; the full tyme that ye shoulde fatte

her is but twenty-five dayes." (*Husbandlie Ordering of Poultrie*, c. 27, black letter, 1581.)

Markham's Mode of Fattening.

Chickens.—"If you will have fat cramm'd chickens," says Markham, "you shall coope them up when the dame forsaketh them; and the best crammes for them are wheate-meale and milke, made into dough, and then the crammes steeped in milke, and so thrust down their throats; but in any case let the crams be small and well wet, for choaking. Fourteen days will feede a chicken sufficiently." (*Good and cheape Husbandrie*, p. 142.)

Bradley's Mode of Fattening.

Chickens.—"To fatten chickens," says Bradley, "the best way and quickly, is to put them into coops as usual and feed them with barley meal; but in particular to put a small quantity of brick-dust in their water, which they should never be without. This last will give them an appetite for their meat, and fatten them very soon." He thinks the brick-dust acts, as gravel is so universally supposed to do, in bruising the food in the gizzard; an opinion experimentally investigated in a preceding part of this work. "This receipt," he adds, "I had from Mrs. Whaley, of Loftes, in Essex, a lady of great curiosity and ingenuity."—(*Country Gentleman's Director*, p. 7.)

Modern English Methods of Fattening.

Mr. Wakefield's.—In his extensive establishment near Liverpool, Mr. Wakefield fattened with steamed or roasted potatoes given *warm*, which is indispensable, three or four times a day. The fowls were taken in good condition from the yard, confined in dry well-ventilated coops, and covered in, so as to prevent the entrance of too much light. This method was attended with the greatest success.

Mr. Turner's.—At North Chapel, in Sussex, Mr. Turner, a tenant of Lord Egremont's, was wont to fatten about two hundred chickens annually, to a size and perfection not elsewhere known. The food given them was ground oats made into gruel, mixed with hog's grease, sugar, pot-liquor, and milk; or ground oats, treacle, and suet, also sheep's pluck, &c.; and they were kept very warm. They were always crammed in the morning and at night. The pot-liquor was mixed with a few handfuls of oatmeal, then boiled up, taken off the fire, and meal made therewith into a paste, and divided into rolls for cramming. The fowls are put into coops a few days before they begin to cram them, which is done in a fortnight, and then they are sold to the higglers. Fowls thus fattened will weigh about seven pounds, and average five pounds, though some arrive at double this weight.—(*Sussex Agricultural Report.*)

Sir Isaac Coffin's.—The method recommended by Sir Isaac Coffin, is said to produce quick results. He puts

the fowls to be fattened in small cages or pens separately, so that they may be in a manner cased up, and so closely wedged in as to be able to move with great difficulty. These cages or pens must be placed in a warm situation, and the fowls crammed two or three times a day, by means of a cramming funnel, with the meal of barley, wheat, small millet, maize, or the like, soaked in milk. At first, this ought to be given in small quantity, in a rather liquid state, increasing this gradually till the crop be entirely filled. The whole of the cram must be digested before another be given, so that the process of digestion may not be disturbed.

Sir C. Cockerwell's.—The East Indian mode of fattening was introduced with great success, it is said, by Sir C. Cockerwell. The chief peculiarity is, that the cages or coops, made to contain only one fowl, are furnished, like the cages of singing-birds, with two sliding bottoms of wicker-work, which are changed and washed clean every day. The fowls are fed and crammed in the usual way, and the coops are put in a dark place, or covered with mats to exclude the light. They become fat in a very short time.—(*Baxter's Library of Agriculture*, 3rd edition, p. 535.)

Berks and Sussex Mode.—The methods of fattening in these counties, which are famous for their poultry, are very similar to those already mentioned. They keep them at first for four-and-twenty hours without food, then they give them ground oats or barley-meal, mixed with treacle, coarse sugar, mutton-suet, and milk. They are ripe in a fortnight, and if they be kept over

this time, they are seized with a fever, which renders them red in the flesh, and unsaleable, and frequently kills them. The Sussex higglers often fatten on nothing besides oatmeal and water, or milk.

French Methods of Fattening.

At Mans, instead of letting poultry feed at liberty, they are forced to swallow rolls of paste in an oval shape, having about two inches in length by one in breadth, made of two parts of barley-meal, of one part of buck-wheat, and a sufficient quantity of milk ; but it is accounted a more expeditious mode to put the fowls in rows of pens, placed in a warm place ; to cram them two or three times a day, by means of a funnel, with the meal of barley, wheat, small millet, or maize, soaked in milk ; to give them at first a small quantity of this mixture, in rather a liquid state, because no drink is given them ; then to increase the quantity, successively, till it quite fills their crop, allowing time enough to empty it by digestion, before the cramming is repeated again, in order that the process of digestion may not be disturbed.

The cages employed in this mode are a series of small pens, in which each fowl is separate, in a manner cased up, and so closely wedged in that it cannot move but with great difficulty, permitting it only to thrust its head through a single hole, and to mute through another.

The Cramming Funnel.—On a stool, breast-high, there is constructed a kind of funnel, into which the

food is poured ; out of the lower end of which comes a bended pipe, nearly similar to that of a tea-pot : inside the funnel, near the bottom, there is an apparatus supplied with a valve, suspended by a small iron rod and a spring, worked by means of a cord, which descends to the foot of the stool, and is there fixed by a movable board that the feeder can press with his foot. By this motion the spring, by which the valve is closed, is made to perform the office of a forcing-pump, forces down the fattening paste, and compels it to come out of the end of the bended pipe, which the fatterer holds in the bird's bill, above the tongue. He is careful to draw away the chicken the instant he feels it has food enough ; if he goes beyond the proper quantity, he withdraws it again in a vessel placed above the machine, to prevent the fowl's being choked.

Every time the funnel is used, it must be washed with cold water, for fear there should be any remains of the food, which would become sour.

The chickens fed in this manner, which is particularly well suited to poultry-dealers, are, at the end of a week, very white in the flesh, and well tasted. In the course of a fortnight, they are brought to the highest state of which they are capable.

Some persons add to the food a little seed of hen-bane, with a view of rendering it narcotic. Others mix up with it the leaves and seed of nettles, dried and reduced to a powder.

Instead of putting capons, poulards or hen-capons, and other fowls, in pens, many people coop them up in

cages hung in the open air, and made in such a manner that their heads peep out on one side, and their rumps on the other ; thus packed up and immovable, they eat, sleep, and digest nearly the same as in pens.

Formerly, under the notion of ridding the fowls of vermin, which, during the process of fattening, torments them, and hinders digestion ; the feathers were plucked off the head, under the belly, and under the wings. In short, gluttony had made men so ferocious and short-sighted, that instead of putting them, as we have advised, in a dark place, they put out their eyes.

At the time when the French had a decided taste for spices and aromatics, people contrived the methods of varying, at pleasure, the flavour and perfume of the flesh of poultry, by mixing up with the paste for fattening them sweetmeats of musk, aniseed, and other aromatic drugs.

One of the French queens expended fifteen hundred livres in fattening three geese, whose livers she wanted to render more delicate. This method, which could be followed by very rich people only, did not take with the breeders ; but we think this idea might be followed up again, there being no doubt that it is very important to look after, and come at, common substances which, added to the fowl's food, might render it more savoury and sweet.

If thrushes, for example, are excellent when they feed on grapes, if their flesh is bitter when they find nothing but juniper-berries ; if black-birds are not so good eating when they live on ivy-seed ; if there is such a wide

difference between the rabbit that lives on cabbage-leaves, and that which crops thyme, what might not be expected by adding to the diet of fowls such substances as are capable of modifying the flavour of their flesh to advantage?

It is well known that some turkeys, that had eaten a great many onion-leaves, had flesh of an exquisite taste; while others, which had gone through the forest of Fontainebleau, had a very disagreeable one. It is known that nettle, parsley, fennel, wild succory, milfoil, or garlic, introduced into the paste for young turkeys, alters the flavour of their flesh for the better. It is known, in short, that chickens, into whose food phosphate of lime is admitted, become stronger, and their bones more solid.

Heath-seeds, or the tops of heath, are also said to improve the flavour both of fowls and of eggs, as they certainly do that of mutton. The inference accordingly is fair, that if more careful experiments were made than has hitherto been done to ascertain the effects of different sorts of aliment on flavour, discoveries might be made of importance to poulterers, higglers, and all those who keep poultry.

CAPONS.

IF cocks, when young, are emasculated, so as to take away their natural reproductive feelings, it has a prodigious effect upon their condition; and a similar effect may be produced upon young hens by an operation on their egg-organs. The art of making capons has been

practised from the earliest antiquity in Greece, India, and China, for the purpose of improving the flesh of birds for the table, in tenderness, juiciness, and flavour. In our own country it is chiefly practised in the great poultry-breeding districts of Sussex, Essex, and Berks, and is not so well understood in other parts of the country. There are individuals, indeed, who make a trade of it, and it is best to employ one of those when they can be had ; but it is not uncommon for the poultry-farmer's wives and daughters to acquire dexterity in performing the operation. This, indeed, seems to be no new thing, for Mascall, in his minute directions, uses the feminine gender throughout, as follows : " To cut young cockrels," he says, " to make them capons, the time thereof best to cut and carve them, is soone after their dam has left them, or when they cry or pule no more after her, as when they begin to crowe and waxe hote to tread the pullets. The common way of cutting or carving is not to be dispraysed, and is most knowne, as this waye ; they take them in the morning, commonly in the wane of the moone, and layes the cocke in her lappe, upon his back, trussing up his legges by his sides. Then the carver pluckes first awaye the feathers above the vent, and takes up the upper skin on the point of a needle, and slits it over-thwart an inche long, and then takes up the under thin skinne nexte the guts, and slits that likewise. Then the carver annoyntes her fore-finger of her right hande with oyle or butter, and puts it gently to the raines of the cock, on the left side, and with her finger bringes forth the stone. Then she annoyntes the

fore-finger of her left hande, and puts it into the stone on the right side of the cocke, and with her finger bringes it forthe. So done, she placeth the guts, and sowes the skinne up again with a threede, and then annoyntes that place with some fresh butter, and lets him go. But if the day then be colde or weate, keepe them in the house warm for a day or two after their carving; but if it be fayre, let them go abroad."—(*Husbandlie Ordering of Poultry*, c. 23.)

Chinese Mode of making Capons.—The Chinese, who are very expert in the art of making capons, use the following method. The wings of the fowl being folded back till they meet, the left foot of the operator is placed on them, the fowl being laid on its left side: the great toe of the right foot is placed on its legs. The feathers are then plucked off by the side; an incision, about an inch in length, commencing about an inch from the back-bone, and extending obliquely downwards, is made with a knife, the cutting part of which is bevelled to a point, like a dissecting scalpel. This incision is carefully carried through the skin, muscles, and membranes, till the intestines are laid bare, while flat blunt hooks are put into the incision, which is extended and kept open by the elasticity of a bamboo, or whalebone. The intestines are then pushed aside with a pair of forceps, which are used to lay hold of the stone when it is by this means brought into view, while there is passed over it, through a bamboo or elder tube, a horse-hair, which is drawn backwards and forwards through the tube till the spermatie cord is cut through, and the stone

is then scooped out. The other stone is removed in the same manner. No blood issues from the spermatic cords, nor does the animal seem to feel any pain. The hooks are then removed, the wound is closed, the feathers which had been plucked off, are stuck upon the wound with the blood, and the wing being put down on it, the animal walks off as if nothing had happened.

French Mode of making Capons.—Young cocks, three months old, are made choice of for the operation, which must, if possible, be performed before July, as it has been remarked, that capons made later than this never prove fine. The incision is made as already explained, the finger inserted, the stone removed with a dexterous twist of the finger, only acquired by experience, the wound sewed up and rubbed with oil, and finally, the comb is cut off.

It is usual, after the operation, to feed them for three or four days with bread soaked in wine, cooping them up in a place where the temperature is not too high, for, when the weather proves to be very hot, the wound is apt to mortify and cause death.

The capons are never subject to the natural process of moulting, and they lose their previous strong shrill voice. They become dull and melancholy, are detested by the hens, buffeted about by the cocks, and would soon fall victims to their enmity, were they not removed to perform the remaining business of their lives, namely, to eat, drink, sleep, and get fat with all possible expedition.

Method of making Poulardes.

Hen-chickens, as well as young cocks, may be operated upon, so as to deprive them of their reproductive powers, and render them easy to fatten. In this state they are usually, though improperly, termed *hen-capons*, the French term *poularde* being preferable.

The usual method of making poulardes, is, to extirpate the egg-organ, or *ovarium*, in the same way as the stones of the cock are extirpated; but it has been shown by Mr. Yarrell, in the *Philosophical Transactions*, that it is quite sufficient merely to cut across the egg-tube, or oviduct. Poulardes may otherwise be treated in the same way as capons.

Fattening of Capons.

Capons are fattened precisely in the same manner as chickens, by keeping them cooped up in a quiet dark place, and cramming them; or otherwise feeding them abundantly.

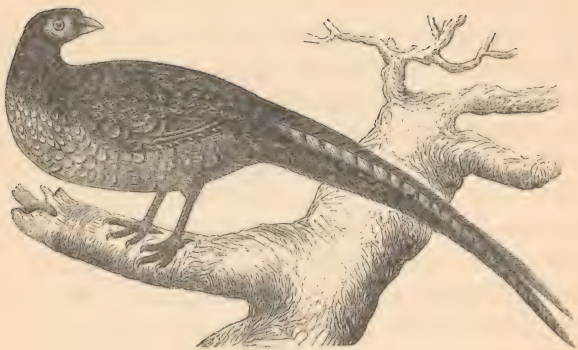


Fig. 19.—The Cock Pheasant.

PHEASANTS.

THE pheasant (*Phasianus Colchicus*,) now naturalized in our woods, may be domesticated like the guinea-fowl, or the turkey, if attention be paid to a few peculiarities of management, of which we shall now give details from M. Dumont, the Abbé Tessier, and the author of *La Manière d'élever les Faisans*, 8vo., Paris, 1772.

On a large scale, several acres of ground are required to permit the birds extent of range ; but, on a smaller scale, an ordinary poultry-yard may be made to answer, though it will be better if the pheasants are kept there by themselves. The yard ought to have a good sward of green turf, and be covered over with netting, as high

as it can conveniently be placed. When this cannot be done, one of their wings should be disjointed.

Young birds of the year ought to be chosen in preference to old birds, which it will be difficult or impossible to tame. They ought to be well feathered and spirited, as, if they appear drooping or out of feather when put in confinement, they are almost certain to die.

Fresh pheasants' eggs may also be set under a hen, and reared like common chickens, giving her from eleven to fifteen eggs. Bantams make the best mothers, and they ought to be chosen with their breasts full feathered. The same attention ought to be paid to them, during the time of hatching, as in other cases, watching them carefully, lest they abandon the eggs, and feeding them regularly, to support their strength.

As the eggs of pheasants take five or six days longer to hatch than those of the common fowl, namely, from twenty-three to twenty-seven days, about the twenty-third day the issuing of the chicks from the eggs must be carefully attended to, and if necessary, assisted in making their escape from the egg, as mentioned in a preceding page.

The young chicks, when hatched, should be left with the mother-bantam twenty-four hours, without giving them any food, as all they require at this time is warmth.

The first food which ought to be given them, is what is called ants' eggs, but which are in fact the cocoons of the large rufous wood ant, or emmet.

When they are a little older, the green leaves of barley are excellent, and successive sowings ought to be made of this, to supply them with a little cut fresh every day, and thrown down on their feeding-ground.

The mother must be carefully kept in her coop, otherwise they will soon stray too far from home, and she will of course keep with them wherever they go. But so long as she is confined, they will be certain to come at her call to feed, and will thus be rendered more tame than by any other means that can be adopted.

As the young pheasants acquire strength, they may be permitted to go at large, (still confining the mother to call them together,) and there may be added to their food corn of every sort, good malt, raw carrots grated with bread, or boiled carrots, or potatoes mashed with bread crumbs, and given hot. These are excellent for strengthening them, and are but seldom used, we believe, in this country.

The ants' eggs may be mixed with hard-boiled yolk of egg crumbled down, and with a little boiled bread and milk—the milk being squeezed out, so as not to render it too liquid.

The mother-bantams are now to be put under coops, so that they cannot range about, while the osiers of the coops may be wide enough asunder for the chicks to go out. If they are not very robust, however, they ought not to be allowed to range at full liberty, but have a place inclosed to feed in apart from the mother, who may still be fed on corn.

A place with a good sward of grass is the best for

the chicks to feed in, but care must be taken not to let them go thither till all the dew is evaporated, nor when it rains, or blows cold, as cold and moisture are very injurious, and may destroy the whole brood.

Ants' eggs are the best food for them, though these ought to be given rather moderately. Meal-worms are still better, but cannot readily be procured in great quantity. Gentles may also be given.

When two months old, they may dispense altogether with the care of the mother-bantam, and though ants' eggs are always excellent food, they may with safety be discontinued if they are scarce. Towards the end of autumn, about the end of October, they will, if left at liberty, stray farther and farther from the place of their nativity; but, by means of regularly supplying food, they will continue to haunt the neighbourhood; and they will be almost certain to resort thither in spring, to pair, and lay their eggs.

The laying time requires the most careful attention for the purpose of increasing and even of continuing the breed, which many accidents may tend to render extinct. Without going to the trouble of keeping hens in confinement during the winter, though it will be indispensable to feed them then by scattering corn in their haunts, old hens, which have been reared as already directed, and which are therefore half tame, may be entrapped, towards the end of February, by a sort of coop, pulled by a string, in the same way as boys catch birds with a sieve. These trapped hens, when kept in large coops and well fed with barley or wheat, will lay

in confinement, and the eggs may be hatched as already described ; otherwise the eggs for hatching must be procured by finding the nests in the woods.

The hen-pheasant is at her prime for laying when two years old, and at four years old begins to be unfruitful. Up to the first of March, the pheasants in confinement may be left together ; but after this they ought to be separated into families of from four to seven, one being a cock. The hens begin to lay about the middle of April, laying generally about two o'clock in the afternoon, every other day, till ten or twelve eggs have been laid, when the interval between the layings is increased. A hen generally lays about twenty eggs, but in confinement, one has been known to lay triple the number. To prevent the eggs being injured by the heat of the hen's body each time she lays, they ought to be regularly removed, and kept in a cool place till enough are procured for a hatch.

Pheasants are very liable to be attacked with a fatal disorder, usually termed the distemper ; supposed, without proof, to be contagious, from its attacking many birds of a neighbourhood much about the same time. The Abbé Tessier thinks this may be more correctly ascribed to the influence of the weather, in the same way as the spreading of the influenza and of cholera is explained by many physicians. Be this as it may, it can do no harm, and may do good, to separate the distempered from the healthy birds, and give to the former ants' eggs, hard-boiled yolk of egg, and hemp-seed, as nutritive and stimulant ; for the distemper, according to

Tessier, arises from debility ; most of the birds which he opened after death exhibiting great emaciation.

The Fattening of Pheasants.

It is not usual, we believe, to employ artificial modes of fattening pheasants, but the Romans, in Columella's time, did not neglect this amongst other luxuries. "The ancients," says Mascall, "did use to fat and nourish the pesantes, both cocks and hennes, not onely for increase, but as wel for feasts and banquets. In the beginning, they gave them water and wine mixte together, to make them forget their natural place, and then they fed them with barley-meal, steeped in water, and ground beanes and steeped barley, mixte together with millet and also naves, [turnips ?] and linseede boiled, then dried and mixte with barlye-meale. Likewise, to heate them and to purge them, they did use to give them fenu-greek for the space of five days ; and so they were cleansed and mude [ripe] in forty dayes. And thus some keeps them that are of skil in nourishing of daintie fowle."—(*Husbandlie Ordering*, c. 77.)

THE PEACOCK AND PEAHEN.

THE pea-fowl is a native of the East, and is kept here more for ornament than use. Stephanus, indeed, praises their flesh, which he says "doth nourish much ;" but Gervase Markham, on the other hand, says it "is very unwholsome, and used in great banquets more for

the rarenesse than the nourishment ; for it is most certain, roste a peacocke or peahen never so drie, than set it up and look on it next day, and it will be blood-rawe, as if it had not beene rosted at all."—(*Good and Cheape Husbandrie*, p. 154.) But this, of course, is a fable.

There is, besides the common sort, a white variety of this bird, which is often met with.

One cock may have from two to four hens. When the peahen begins to lay, she secretes herself like the turkey hen, as much as possible from the cock, who will break the eggs if he find them.

The place chosen for the nest is generally well selected. In one which we observed at Syon House, the seat of the Duke of Northumberland, the mother-bird had made choice of a very sheltered spot, the nest being overhung by a low branch of a spruce fir, which was suspended over it like an umbrella, and completely protected it from rain and dew. Another circumstance was still more remarkable: it is well known, that female birds generally wear off a considerable portion of the feathers from their breasts, by their frequent movements in turning their eggs; now, as her eggs were placed on the bare earth, no grass growing under the drip of the spruce-branch, the breast of our peahen must soon have been rubbed bare of feathers. Foreseeing this event, instinctively as it would appear, the careful creature had prepared a soft cushion of dry grass, upon which her breast might rest; and this cushion was placed on the most exposed side of the nest, but no part of it under the eggs themselves.

The watching of the peahens to secure their eggs for hatching, must be managed as hereafter directed for turkeys, like which they lay in the morning. (See p. 212.)

It is not unusual to set the eggs of a common fowl under a peahen along with her own, but this must be done with some management, as the common fowl's eggs hatch in twenty-one days, whereas the peahen's require thirty days. "Ye must turn her egges," says Mascall, "with your hande, and those that ye turne, marke the upper sides thereof with ynke, that ye may knowe which is turned when she riseth agayne, for her eggs being great, she cannot turn them herself." We cannot see the necessity of all this trouble.

The peachicks are very tender, the least cold or wet being almost certain to kill them, and therefore they will require to be tended with great care, similar to pheasants and turkeys. The best food for them is new cheese, or curd, prepared from milk, with alum, ants'-eggs, meal-worms, and hard-boiled yolk of egg. When older, they will, like the old birds, feed on boiled barley, or other grain of any sort. They are hence very destructive to corn-fields and to gardens, if permitted to range at liberty. They are voraciously fond of reptiles, and will keep a place clear of frogs, lizards, and similar creatures.

They suffer greatly in moulting, when it is said to be useful to give them honey, wheat, coarse ground beans, and oats, with fresh water.



Fig. 20.—The Male Pintado.

THE GUINEA FOWL, OR PINTADO.

THE guinea fowl (*Numidia meleagris*) is a native of Africa, long domesticated in Europe. It may be considered as somewhat intermediate between the pheasant and turkey.

Like most domesticated fowls, there are several varieties of the pintado, besides the mitred, the crested, and the Egyptian, which are considered by naturalists as distinct species. One of these varieties is wholly white; another, has only the breast white; and a third has the caruncles, or wattles, at the mouth, double.

The guinea fowl is about twenty-two inches long, and from standing high on its legs, appears to be larger than it really is. It is a noisy bird, having a very peculiar call-note, and is turbulent and restless, con-

tinually moving from place to place, and domineering over the whole poultry-yard, boldly attacking even the fiercest turkey-cock, and keeping all in alarm by its petulant pugnacity.

This species differs from all other poultry in its being difficult to distinguish the cock from the hen, the chief difference being in the colour of the wattles, which are more of a red hue in the cock, and more tinged with blue in the hen. The cock has also a more stately strut.

It is more from curiosity than profit, that guinea fowls are kept, though they are excellent for the table; and their eggs, though small, are much esteemed; but they are not easy to rear in our cold climate. Messrs. Boyce, of Stratford, in Essex, feed many hundreds for the London market.

According to Mascall, "they require great attendance, and yee must make their court somewhat hye, set also with bordes agaynste the walles, round about the court, in length, and their perch made so to sit where the sunne may shine, and each bird his place. And also to have one general house to cleanse the hens, and to give them their meate, and closed all above and before with laths, very nie together, about the height of a pole from the earth, well covered all over." The hens, he says, sit thirty days, and the young must be managed like young turkeys, as they are equally, if not more tender. In fact, the whole management of both the young and the old, may be precisely the same as that of turkeys, in feeding, hatching, and fattening.



Fig. 21.—The Turkey Cock.

THE TURKEY.

THE wild turkey from which the domestic breeds are derived, is a native of America, where it may still be found in the remoter parts of the north, though the numbers are fast diminishing, and it will probably be-

come, at no distant period, extinct, as the dodo has in the African Islands, and the cock-of-the-woods, as well as the bustard, in Britain. It was introduced into this country in the reign of Henry the Eighth, though it had been known at an earlier period in Spain and France, where it was first served at the marriage feast of Charles IX. in 1570. It became not uncommon in England so soon as 1585. The name of Turkey alludes to the resemblance between the head of the Turkey cock, and the helmet of a Turkish soldier, which, as represented in old drawings, appears formerly to have consisted of a bluish-coloured coat of mail over his head and shoulders, with red lappets.

Varieties of Sorts.

The wild turkey is of a beautiful bronze and green colour, but domestication has as usual produced several varieties. The bronze or copper coloured one, is found to be too delicate for our climate, and soon degenerates, though its flesh is said to be superior. The early voyagers and buccaneers, by confounding a sort of vulture, called the turkey-buzzard, with the wild turkey of America, reported that the wild turkeys were altogether unfit to be eaten.

The most esteemed variety, both in France and England, is that of a blackish colour; but of late years, the esteemed Norfolk breed of black turkeys has been crossed with the large Virginian turkey, and the new breed is said to be superior to the old one. The author of the original Agricultural Report of Norfolk, thinks that the

cause of the superiority of the turkeys of this county, is the extensive range which they are permitted to take, and the dryness of the soil. In Ireland also, where turkeys are, as we can ourselves testify, most excellent, the soil is dry, though the climate is moist.

According to M. Parmentier, the white turkey, contrary to all analogy, is, by some, thought to be most robust, and easily reared and fattened, and hence large flocks of these may be seen in some parts of France. But the black turkeys, on the contrary, are always most marketable, from its being said their skin is whiter, and their flesh finer and sweeter, while the males are larger, and the females better feeders.

There can be little doubt that black turkeys are produced in greater numbers than any other colour. Madame Clavier, an ingenious French lady, fond of rural economy, told M. Parmentier, that she had a white turkey-cock in her yard, with ten black turkey-hens, and yet she never had a white chick hatched, nor even shaded in the slightest degree. In Dauphiny, on the other hand, they are found of every shade of colour, from deep black to white.

Lawrence tells us, that a turkey-cock, the property of J. Lee, Esq., of Redbrook, near Whitechurch, which was black in the year 1821, became afterwards perfectly white, and in the process of moulting, just before this singular change, it gradually showed every shade between the two colours, the feathers being alternately black and white.

HABITATION AND SHELTER.

It is important, in breeding animals, to attend to their natural instincts as much as possible, and it is, no doubt, from the neglect of this, that much of the degeneracy and difficulty of rearing them which occurs, may arise.

Naturally the turkey is a wandering, excursive, and migratory bird, in its native forests of North America, and hence it is obviously unnatural to confine it to the narrow range of a poultry-yard, much less to the courtyard of a suburban residence. Turkeys have a strong disposition to prowl, and will steal away sometimes a long distance from home, apparently wishing not to be observed. Delicate as they are supposed to be, they can find their living in the woods of this country, and were it not from their great size and stupidity, might, perhaps, be naturalized like the pheasant. "Two years last hay harvest," says an intelligent correspondent of the *Sporting Magazine*, "a two-year old cock, and two hens of the same age belonging to me, were seen to prowl into a wood of eighty acres, a short distance from my house; and night coming on before they were observed by the person who had the charge of them, all attempts to recover them were in vain. No tidings being had of them for several weeks, I of course concluded they were either picked up by some persons who had stumbled upon them, or had been killed by foxes. About six weeks ago, however, I was riding through a large covert, about half a mile from that into which my turkeys were seen to go, when a hen, apparently in a state of alarm, ran before

my horse's feet, and disappeared in the bushes. It immediately occurred to me, as the colour was the same, that she was one of the hens that I had lost more than two years before. I have since caught her, and she is now in my yard. The other hen, which has young ones, was also caught, but on being given to a boy to hold, broke away from him again, and is still in the wood with the cock bird and the young ones. The one I recovered had been sitting on eggs, as was evident from the state of her breast. Thus have these birds survived two winters, one a very severe one, in the woods, without either food or shelter, except that which Nature provided for them."

The strong natural propensity of turkeys to perch in the open air, and on high places, is a sufficient reason for those who rear them to attend carefully to this point. Scarcely, indeed, does the *red*, as it is called, begin to shoot, when turkeys show their unconquerable desire to perch in the open air, though this cannot be safely permitted till they are two or three months old. Open sheds are consequently best suited to them, with roosting bars, fixed as high as convenient from the ground.

It strikingly shows the propensity in question, that if turkeys have been compelled to pass the night in close and filthy hen-roosts, the instant the door is opened they rush eagerly out, in consequence of the uneasiness they have experienced by having been shut up, as if they were anxious to escape from some great danger. Their house must accordingly be roomy, and their litter frequently renewed.

In the summer time, they may be permitted, if suffi-

cient care be taken in watching them, to roost on high trees, that they may indulge their natural habit; but this can only be conveniently done by way of experiment. The best substitute will be lofty perches, which must be three times as thick as for common poultry. It is important, during winter, that these perches should not be exposed to the sweep of frosty winds, which are apt to cause the feet of turkeys to freeze.

FOOD.

THE natural food of turkeys in their native forests, appears to be fruit and seeds, as well as green herbs. The old writers represent them as more voracious than profitable. According to Mascall, they "do rather enrich the mouth than bring any great profit to the farmer or breeder, and so many turkeys in his court, so many moile colts in his stable, for they are a coffer for oates, and a sacke for corne—a gulfe, a swallower of barns—a devourer of mutch meat," an opinion in which Gervase Markham does not agree.

"Turkies," says he, "howsoever by some writers they are held devourers of corne, strayers abroad, ever puling for meate, and many such like fained troubles, as if they were utterly unprofitable; yet it is certain they are most delicate either in paste or from the spit, and being fatt, far exceed any household fowl whatever. Nay, they are kept with more ease and lesse cost; for they will take more paines for their foode than any other bird, only they are enemies to a garden, and from thence must ever be barred. Till you fat them, you neede

not care for foode for them.”—(*Good and Cheape Husbandrie*, p. 150.)

“They cannot,” Audubon informs us, “be said to confine themselves to any particular kind of food, although they seem to prefer the pecan-nut and winter grape to any other; and where these fruits abound, are found in the greatest numbers. They eat grass and herbs of various kinds, corn, berries, and fruit of all descriptions. I have even found beetles, tadpoles, and small lizards, in their crops.”—(*Ornith. Biography*, i. 11.) The traps which the settlers lay for them are baited with maize, a pretty strong proof of their fondness for this species of corn.

In their native forests of America, where they were formerly wont to travel in flocks of several hundreds, their chief food is said to be, at one season, the seeds of a sort of nettle, and at another, a small red acorn, which ripens in March, when the turkeys become so fat by feeding on it, that they fly with difficulty, and are then easily run down by dogs.

Though capable, however, of foraging for their food in a wild state, they seem to lose part of this instinct when tame, for when they get into a field of corn, they will do nearly as much damage as pigs, by beating it down, but they are very dull and stupid at getting the corn out of the ear, unless very ripe, and will walk through a field of peas or beans without opening a single shell, even if they are ripe.—(*Rusticus, in Sport. Mag.*, Aug. 1824, p. 294.)

Farmers in many districts of the country are hence

prevented, by the great injury which they do to field crops, from rearing turkeys at all.

It must be confessed, says M. Parmentier, that if turkeys were fed exclusively on grain, seeing that they are very greedy, they would well merit the name of wheat-coffers, which they bear in some districts. But there are other better and cheaper means of feeding them than with grain, for they will eat much offal in the fields, that would otherwise be lost, and it is by no means requisite that they should always be glutted previous to the time when they are to be fattened for the spit or for the market.

Injurious Food.—It is important to know, that there are certain species of food which not only disagree with turkeys, but even may act as poisons and destroy them. It may easily be understood that the seed of such poisonous plants as henbane, foxglove, and hemlock, should do so; yet, it is said, that vetches or tares, marrow-fat peas, and most sorts of pulse, are little less deleterious to them, a circumstance which could not have been inferred by anticipation, as these are found to agree remarkably with barn-door fowls, as well as pigeons, so much as to prove excellent for fattening them.

PAIRING.

IN a domestic state, the turkey-cock is brought to feed along with the hen, but he does not do so when wild in his native forests. It may not be out of place to mention a few of the peculiarities observed in the

wild race, by Audubon, and the earlier travellers in America, as this may lead to useful suggestions for managing tame turkeys.

The males associate and feed in companies of from ten to a hundred, apart from the females, which advance, sometimes singly, sometimes followed by their young, and sometimes in united families, forming a band of from seventy to eighty individuals. All these exhibit a dread of the old cocks, and are constantly on the watch to avoid them, for though the young birds are now, in the beginning of October, about two-thirds grown, the males seem already to regard them as rivals, and whenever they have an opportunity will attack and kill them by repeated blows on the head.

About the beginning of February, or early in March, the wild turkeys begin to prepare for breeding, the females at first shunning the males, which eagerly pursue them, and utter their peculiar gobbling call. At night, the two sexes roost apart, though usually at no considerable distance. When a female chances to utter her call-note, all the males within hearing return a loud response, in a rolling gobble of rapidly successive notes, as if with the design of emitting the last as soon as the first. When their numbers are considerable, the woods, sometimes for many miles, resound with this singular hubbub, continued for about an hour, when all again becomes still, till, at the rising of the sun, they leap down from their roost-trees, and strut about with expanded tails and drooping wings.

As soon as the call-note of the hen turkey rises from

the ground, all the cocks in the vicinity immediately fly towards the spot ; and the moment they reach it, whether they descry her or not, they strut about with great pomposity, and puff great quantities of air from their lungs. Should the males, during such movements, encounter each other, as often happens, furious battles ensue, and are only terminated by the death or the flight of the vanquished, and many lives are thus lost.

When the male and female turkey meet, the ceremonies of strutting and opening the wings are carried on by both parties with the same pomp of movement that used to distinguish the old courts of St. James's and Versailles. The match being at length agreed on, the attachment appears to continue during the season, though the cock is by no means constant to his mate, and does not hesitate, should opportunity offer, to bestow his attentions on others. But when the above preliminaries have been settled, the hens follow their favourite cock, roosting on the same tree, or, at least, in its immediate vicinity, till the time of laying, when the hen has recourse to every stratagem to conceal her eggs from the male, and even to avoid him, except during a short period each day.

After this, the cocks become clumsy and slovenly, if one may say so ; they cease to fight with each other, give up gobbling, or calling so frequently ; and assume so careless a habit, that the hens are obliged to make all the advances themselves. They *yelp* loudly, and almost continually, for the cocks,—run up to them,

caress them, and take every means to rekindle their expiring ardour.

At a rather later period, the cocks become much emaciated, their *breast-sponge* becomes flat, and they separate themselves entirely from the hens, and even desert the neighbourhood where they are.—(*Audubon, Ornithol. Biogr.* i. 53.)

The turkey-cocks which are kept for breeding, rather than for the table, “ought not,” says Mascall, “to be passing a yere, or two yeres old—three yeres is the most, and too much—for, being olde, they are so heavy in treading, they wyll commonlye hurt the hennes, in broosing their backes, and treading off their feathers off their backes. And also, it is not good to keep two cockes in treading time; for one will hinder the other, so that your hennes’ eggcs come to small profite in setting.”—(*Husbandlie Ordering*, c. 46.)

“Your turkie-cock,” says Markham, “should be a bird large, stout, prond, and majesticall, for, when he walketh dejected, he is never good.”—(*Cheap Husbandrie*, p. 151.) According to M. Parmentier, both the cock and hen ought to have short legs, a full shape, and great vivacity and energy in all their actions. For breeding, it is peculiarly necessary that both should be well formed, and in healthy condition.

The number of hens which should be put with one cock is disputed amongst several authorities, as we have seen to be the case with the common fowl. M. Parmentier says, that, when one has a certain number of turkeys, it is indispensable to have a proportional

number of cocks ; and is of opinion that one cock will be sufficient for twelve females ; and in this number he cannot be far wrong, if once treading is, as he seems to think, proved by experiment, efficient to fecundate all the eggs of one laying. So satisfied, indeed, is he of this fact, that he thinks the cock may be dispensed with and sold, after the hen begins to lay.

Lawrence, on the other hand, advises six hens to a cock, though he thinks more may do no harm ; and mentions it, as a common practice with breeders, to keep a cock for the use of any neighbours who may have so few hens as to render it too expensive to keep a cock.

LAYING.

IN the wild state, about the middle of April, when the season is dry, the turkey-hens begin to look out for a place in which to deposit their eggs. The nest consists of a few withered leaves placed on the ground in a hollow, scooped out by the side of a log, or in the fallen top of a dry leafy tree, under a thicket of sumach, or briars, or a few feet within the edge of a cane-brake, but always in a dry place. When about to lay, the hen always approaches the nest with extreme caution, scarcely ever taking the same course twice ; and when she has done laying, she carefully covers the eggs she is about to quit with leaves.

In a domestic state, the turkey-hen is very apt, if not prevented, to straggle abroad, and lay her eggs in secret places, and therefore it will be requisite to watch

them, and bring them back to the place prepared for this purpose.

The time of laying is usually in March—a month earlier than the wild turkeys lay—and it is an infallible sign of the health of a bird. It may readily be seen, indeed, when a hen is about to commence laying, by her vivacity and haughty strut. It also indicates the same when she endeavours to secrete herself, and steal away from the observation of the keeper. She utters, besides, a peculiar note, indicative of her feelings; and when this has once been heard, it can never afterwards be mistaken. Upon observing these signs, the keeper must prepare a suitable nest, and it will be well to put into it a chalk egg, to induce the bird more readily to lay there.

Some persons are in the habit of giving turkeys stimulating food at the laying period, in order to promote their fecundity, particularly oats and hemp-seed; but M. Parmentier thinks this is quite superfluous, and may even, perhaps, be injurious, by tending to produce *clear* or infertile eggs. By proper food, and shelter during winter, indeed, turkeys may be brought to pair and lay earlier than they otherwise would do; but, though this might have the advantage of procuring a second brood about the end of summer, it must render the first more difficult, on account of the cold weather in spring, to be reared with success.

The time of laying is almost invariably in the morning of every second day, though some hens will lay every day, till from fifteen to twenty eggs have been

laid ; in a wild state, more usually from ten to fifteen, according to the age of the bird ; for a young bird, two or three years old, will lay more, and larger eggs, than when only one year old.

The habit of laying in the morning may be usefully taken advantage of, where several turkey-hens are kept, to examine them individually, by hand, every morning before they go out, and keep back those which are about to lay, till they have done. This will effectually prevent the loss of a single egg, by laying in a secret nest in the hedges, or woods. When they roost in the open air, as is most natural to them, and sometimes practised for the sake of convenience, and to render the birds healthy, it is nearly impossible to prevent the loss of many eggs.

During the whole time of laying, the cock must be carefully kept apart from the hen, at least in the morning, when she is laying ; otherwise, if he find her on the nest, he will ill-treat her, drive her away, and break her eggs.

The eggs are larger and more lengthened than those of the common fowl, of dull cream colour, and speckled with reddish dots. They ought to be taken up as soon as laid, lest the hen, who is heavy and awkward in her motions, should break them on returning to lay, and also to keep them from being sucked by rats or polecats. They may be kept in a basket, either with or without dry bran or straw, hung up in a dry, cool, dark place, till the hen leaves off laying, when none of them will be too old to set for hatching, though, when much older, it may be doubtful whether they will hatch.

It is recommended, by some, to keep each hen's eggs distinct, that they may be put under the hens which laid them; but this appears to be an unnecessary trouble, as a hen turkey will not only successfully hatch the eggs of her own species, wherever they may be procured, but also those of geese, ducks, and common fowls.

It does not appear, from Audubon's account, that the wild turkey has usually more than one brood in the year, unless her eggs have been carried off or destroyed; and Buffon says, the tame turkey lays only once a year. The latter is wrong in this, for, under favourable circumstances, when well housed, fed, and taken care of, the hen turkey will lay a second time, towards the end of summer, sometimes sooner and sometimes later.

In the second laying, there are rarely more than a dozen eggs; and, in order to have the brood from these successful, more than ordinary care will be requisite.

When a second laying is expected, "The sooner," says Rusticus, "that one hen is turned away from her brood, and the brood mixed with that of another, hatched about the same time, the better chance there is of rearing it; as the hen, which is so turned away, will lay again in a fortnight or three weeks, and thus hatch a second time before the month of July is out. Even under these circumstances, the chance of rearing the young ones is very uncertain, as they are hardly strong enough to meet the cold nights in the autumn, when they often become what is called *club-footed*, and die. I rather recommend letting the hen lay as many eggs as she will, and turning her off when she becomes

broody. Hens, thus treated, will lay again in the month of August, so that, under all circumstances, they may be called profitable birds.—(*Sporting Magazine*, August 1824, p. 294.)

Mascall mentions similar circumstances, when he says—"Those hennes that laye their eggs later, laye and sitte, bring up their chickens about mid August, or after, which chickens are so tender in winter following they will hardly prosper, for they may abide no colde."—(C. 47.)

HATCHING.

A TURKEY-HEN is one of the most steady sitters of any known fowl. Even before she has completed her laying, she appears quite anxious to sit, begins to cluck like the common fowl, and continues on the nest till her breast becomes bare of feathers. "When an enemy," says Audubon, "passes within sight of a [wild] female, while laying or sitting, she never moves, unless she knows she has been discovered, but crouches lower until he has passed. I have frequently passed within five or six paces of a nest, of which I was previously aware: on assuming an air of carelessness, and whistling and talking to myself, the female remained undisturbed; whereas, if I went cautiously towards it, she would never suffer me to approach within twenty paces, but would run off."—(*Ornith. Biogr.* i. 6.)

In the domestic state, when the turkey-hen is about to sit, her instinct is truly remarkable. Her little artifices to conceal her eggs, and her tricks to deceive those

who might try to discover her nest, appear almost dictated by reason ; but she manifests little of this in sitting, for when her eggs are taken away, she will continue to sit on almost any substance whatever ; she would even sit upon stones, and remain on them equally the same ; and would perish there to a certainty, were not her own eggs, or those of some other bird, returned to her. It is therefore a matter of consequence that she be satisfied ; for sitting without eggs would fatigue her more than natural hatching. Eggs put all at once under the sitter, should be first marked with ink, in order to distinguish and separate those she still lays, after having begun to sit, and which, were they at all slow in hatching, would be most certainly abandoned. The hen willingly leaves the nest as soon as she perceives the chicks ; it is moreover expedient to examine them by candle-light, to be certain they are fertile.

Though turkey-hens rarely require to be forced to sit, yet, when this is necessary, M. Parmentier recommends them to be placed on a nest filled with eggs, in a close, quiet place, and it may almost be depended upon that they will not quit it. This may be done, he says, with still more certainty, as follows : the bellies of the hens must be dipped in cold water, plucking the feathers from underneath, and flogging them with a sprig of nettle, keeping them warm on a layer of straw ; they may be also made drunk with bread soaked in wine and a little brandy ; and in this state of intoxication they must be placed on those eggs intended for them. On recovering, they seem to have already taken an affection for them ;

they continue to sit on and take care of them, and become as good mothers as those who had shown the greatest disposition to fulfil the duties of that situation.

The sitters may be all kept in the same place, without separating them by partitions ; it is enough that each have a nest, at some distance from each other, that they may not rob one another of their eggs. The place must be dry, warm, and dark, or hidden by a particular shelter, having a small separate yard adjoining, where the chicks may be safe in the first days of rearing.

The nests for hatching may be laid in the corner of their habitation, by throwing some straw, or a straw mattress, sufficiently stuffed, not high, but pretty thick, so that they may get up and down with ease, without breaking the eggs. The nest may be formed of a circular pad, or roll, stuffed with matted straw, and about fifteen or sixteen inches in diameter ; the inside being filled with soft bruised straw, on which the eggs are laid, which being secured by the border, will not roll about when the hen makes a motion to get in or out of her nest, or turn her eggs.

When turkey-hens have been left to themselves during their laying, and have chosen a nest at a small distance from the house, there is hardly anything to be done, for they will leave it with difficulty, and it is even prudent not to thwart them, for they generally hatch their own brood safely, and the young ones are the stronger for it.

We must particularly recommend to keep the turkey-hen, when sitting, clean, and to take care she does not moot in the nest, which would infect the eggs ; though

a good mother will only moot when she takes her food.

Where there is a certain number of turkey-hens, it is not necessary to wait till they have all done laying, to make them hatch together. When the weather is unseasonable, this would be running the hazard of losing all in a single moment. It is, however, advantageous to put several to hatch at once, so that if any accident happen to the sitter, it may be remedied by giving up to another those eggs that are hatching, or ready to be hatched; besides, the young ones being all of the same strength, they do not starve the weaker ones. It is easier and more saving to rear them in this manner, in flocks, under the direction of a number of turkey-hens, than to leave each family to its own mother.

Another advantage derived from this practice is, to determine the females to sit a second time on the eggs of common fowls; or, still better, to recommence laying a second time. In fine, when two broods of young ones are given to one turkey-hen, it is the means of procuring repose to the weaker mother, and of sooner obtaining from her a second laying.

But when eggs or chicks are about to be slipped under another sitter, it must be done so that she does not perceive it, the evening being the proper time for this, so that on the morrow the new-comers may appear to be of her own family. This caution is also necessary in substituting other eggs, and taking from the sitter those on the point of being hatched.

The turkey-hen will sit on the fresh eggs given her

without the least difficulty ; but it is proper not to give her more eggs than she can easily cover and heat with her body.

The timidity of turkey-hens, when sitting, makes it indispensable that no one approach them, except the person who usually gives them meat and drink, either near the nest, or outside the habitation. All fowls, when hatching, are known to turn their eggs regularly, to bring those in the centre to the circumference, and the contrary ; and hence many housewives are in the habit of watching their opportunity, when the sitting turkey-hen is feeding or taking a little exercise, to share this care with her, by means of which the heat is more uniformly imparted ; but it is trouble wasted, for this care ought to be left exclusively to the sitter ; and it is also wrong to touch those eggs half-hatched, unless they be found out of the nest, in which case they must be carefully replaced. How many broods have been lost by not properly attending to these circumstances ! Nothing thwarts and disturbs the females more than to meddle with their brood till the moment they are hatched.

The turkey-hen, after finishing her laying, will readily sit either on a duck's, goose's, or fowl's eggs, observing that because the two first being four weeks in hatching, and those of the fowl three, the last must be put under the mother a week later, so that they may all be hatched almost in one day. But it is remarked that these eggs do not constantly answer, for their being of an unequal size, and their shell more or less hard, they can with difficulty receive the same degree of heat ; besides, the

different affections of the young ones disturb the tranquillity of the mother. It is better, accordingly, to give her only one sort of eggs, except in the particular case, in which it might be, perhaps, useful, as we shall immediately mention, to add constantly to each brood of turkeys two or three eggs of the common fowl. Thus, by three or four good turkey-hens, the whole farm-yard might, in a short time, be stocked with poultry.

In cases where it is wished to rear a great quantity of poultry, there is much advantage in keeping turkey-hens on purpose to hatch, the more so as, of all sitters, they are the most patient and assiduous. When the brood of chicks is hatched, the young ones may be given to another mother, and a double number of fowl's eggs dexterously slipped under her, which, as they only take one-and-twenty days to hatch, do not fatigue the sitter so much as would two broods of her own eggs, one after the other; besides, the way to get early pullets is by giving up the brooding of them to the turkey-hen, whose laying is sooner over than that of the common fowl, and to put her in the way of having a second laying.

To turn to advantage the time when the turkey-cock reposes, it has been attempted to use him to sitting, as the capon does. "The repeated experiments," says M. Parmentier, "which I have tried, have fully proved to me, that when he had been constrained to it by every possible stratagem, he acquitted himself in such a manner as to deserve to be compared, for his assiduity in constantly remaining on the eggs, to the true sitting mother. But when the young ones appear, their cries

and motions scare him, and he either kills or abandons them."

Although the turkey-hen is rightly styled a patient and attentive sitter, it sometimes happens that there may be individuals that will eat their eggs. In this case there is nothing to be done but to get rid of them, and put their eggs under another mother, whose appetite is less depraved.

With respect to the two broods which the turkey-hen can produce, it is said that the females resulting from the eggs of the second are not apt to sit; an erroneous notion, probably arising from having put young hens from this brood to sit; for it is well known, that if young hens lay soon, they rarely sit well.

TURKEY CHICKS.

ON the thirty-first or thirty-second day of sitting, turkey-chicks issue from the eggs; but as they are not all excluded together, they must be put successively into a wicker-basket, filled with wool or feathers, deposited in a warm place, and sheltered with care, especially in cold weather. When the brood is entirely excluded, if the turkey-hen is not immediately to make a second, the little ones may be put back to her, care being taken to supply them all with food and water.

Among the chickens which compose the brood, there are some which require a little help to get out. If there appears in the egg a mark, or small hole, through which the bill of the chicken can be seen, the shell must be

broken very slightly on the outside, lifted up with the nail, or the point of a pin, so as to make the hole wide enough for the head to pass, taking care not to touch the chick, which would immediately die. In circumstances in which the chick requires help to get out, it must be administered with much circumspection, and the operation must only be resorted to when the chick has already made an opening insufficient for the passage of the head. It is no less important to disencumber newly-hatched chicks from a pellicle with which the inside of the shell is lined. It is said to be a custom in Sweden, that when turkey-chicks are hatched, they are plunged in cold water, and made to swallow a pepper-corn to strengthen them; and in other countries, that their legs are plunged in wine during eight days, and that they are even made to take a few drops.

These various customs may perhaps be useful when the young ones are weak and drooping. In this case, a pepper-corn, or a drop of wine, reanimates and warms them, excites their appetite, and disposes them to take their first nourishment. But we may observe, that our impatience often does a good deal of mischief; and it is better when the weather has been favourable for hatching, that the eggs be not touched; while the cold-bath and the pepper-corn are perfectly useless. Wine alone, however, must not be neglected, if it appear necessary. Birds on leaving their shells quit a warmth of twenty-five to thirty degrees of Réaumur, and often pass into a medium whose temperature is one-half less. In the beginning of its existence, therefore, the newly-hatched

chick remains under the wings of its mother, where it finds a warmth nearly equal to what it had in the egg. By making it leave this shelter to handle it, to bathe, and make it swallow pepper, it passes too suddenly from heat to cold, from rest to exercise; and this sudden change, hurtful to animals grown up, becomes more especially so to the turkey-chick, whose natural delicacy and want of feathers render it more sensible to these transitions of temperature.

Turkey-chicks are fed at first on bread, crumbled and soaked in wine, given to them in the hollow of the hand, and afterwards on a pallet; new cheese, unsalted, may be mixed with it, or the curd of milk with hard eggs, nettles and parsley, chopped up and made into a paste, more moist than dry, laying it out on small, broad, flat stones, three or four inches long by two in width. The chicks may be divided into flocks of a small number, and prevented from tormenting one another; by which means their feet and plumage are prevented from sticking together, an inconvenience as much against their health as the beauty of their feathers.

Although nettles and parsley are the most wholesome plants for turkey-chicks, and are everywhere to be met with, bramble-leaves may be substituted when these are not to be got at. They may be mixed with barley-meal, beans, or maize, according to local resources. They may be made into balls, about the size of the fist, and held out in the hand to the chicks, which then press and place themselves around, pecking at this paste till they are full. It must be given them several times a day, as

often as they digest. Water is given them to drink in very shallow vessels, in which they cannot wet themselves, as this would be very injurious. In order to prevent the mother turkey from robbing the chicks of their food, she must be cooped up, leaving them at liberty to run about, giving her barley and water in her own coop. The chicks may be exposed to the warmth of the sun during two hours, when they must be turned in, but may be kept out longer the next day. They will be thus accustomed to the open air, till they become vigorous and can help themselves. If the place in which they are left at liberty with their mother be too extensive, she must be tied with a string to a post, the young ones going but little from her ; and, above all, a shed should be placed near her, made of boards, and supplied with straw, to shelter them from sudden storms, or hot, drying winds. The scorching sun and the rain are, above all, hurtful to them, and it is indispensable to shelter them from the one or the other, at least during the first six weeks.

As turkey-chicks, at the moment of their exclusion, do not seek their food like common chicks, and as they are not instructed in the least to do so by the mother, for she seems to be more taken up with her own preservation, some impatient persons have thought it best to cram them ; but this is always hazardous, as the chick's bill is liable to be broken. In order to obviate this inconvenience, it is usual to put in two or three eggs of the common fowl along with those of the turkey-hen ten days after sitting, so that the young ones may be

hatched at the same time ; and as the common chicks peck and eat as soon as they are out of the shell, they set an example for turkey-chickens which these imitate, and which determines them to eat sooner than they would otherwise do.

This dangerous practice of cramming has been recommended by the Abbé Rozier and others ; but he seems to have been led into an error, for M. St. Genis, who always speaks from his own experience, very judiciously remarks, that one must not be in haste to make turkey-chickens eat ; that when they are taken from under their mother to be handled and fed, they perish sooner or later, on account of the difference of temperature through which they pass so suddenly ; and he is of opinion that turkey-chicks should be left to mere nature, as, being so excessively delicate, they ought not to be taken from warmth and repose. M. St. Genis moreover observes, that they are hardly out of the shell when they keep under the mother, and show no desire to take any food ; and hence concludes, that animal warmth is, without doubt, infinitely more necessary to them than food. His experiments have led him to the opinion, that two or three days naturally pass over before they go to seek their food, but that afterwards they peck very well, and stand in no need whatever of foreign help.

When the chickens have come to a middling size, and can leave the yard where they have been reared to go into the fields, meadows, and woods, several broods may be given to one turkey-hen, and so form but one

family ; observing, however, that there be not a too great disproportion of age, nor too great numbers, for if she perceives any large chicks mixed with others a great deal smaller, she will peck at and kill them ; besides, being assembled in too great numbers, they could not be properly warmed and enlivened under her wings.

High places, exposed to the aspect of the east and south, are those which always agree best with the chickens, especially when they have a small separate yard, which guards them from the attacks of the larger poultry, and other animals of the farm-yard. From this they may be transferred to some pasture-land, or uncultivated place, covered with wood and bushes, where they can find plenty of insects, and be sheltered from the wind, the rain, and the too intense heat of the sun.

Turkey-hens are preferable to any other fowl in the farm-yard, for leading the young of different families ; as they show the same regard for them as for their own, and no bird of prey nor wild animal dares approach ; while the common chickens, led by a turkey-hen, find food in greater abundance, and fatten sooner ; and they leave their nurse-mother later than if she were a common fowl.

The food mentioned above may be given them till they can digest something more substantial, when it is usual to let them go into the fields. After harvest-time, they find corn on the stubble, which they pick up. They must, at this time, be supplied with plenty

of water, especially when the heat is great; and care must be taken when they stray from home, that they be not caught in storms or rain. They are so fond of the shade in summer, that they will run eagerly to hide themselves in thickets, but they must be prevented from remaining there too long, for experience has often made it appear, that they issue therefrom with sprained legs, and if they are lamed, they become stunted in growth.

TURKEY-POULTS.

THE weak state of the first stage of the chickens lasts, in general, for two months, or till the membranes on the neck and head become of a light or dark red. This remarkable time in the natural history of the bird is really a critical one for them; the dangers which surround them during their feeble youth diminish, and they lose the name of chicks for that of turkey-poults.

The change of colour in the membranes is termed *shooting-the-red*, and as it is a very critical period of a turkey's life—much more so than the period of moulting, the food must be increased, and rendered more nutritive, by adding the yolks of boiled eggs, ale with crumbled bread, wheaten flour, bruised hemp-seed, and the like.

After the shooting of the red, the turkey-poults go into the fields with their mothers, which are not long before they begin a fresh laying, and they mix without danger or difficulty with the turkeys of the preceding years, if there happen to be any. They roost in the open air on trees, or on the roost prepared for them, and, till

the month of October, may be led into fields and meadows, after harvest-time and mowing-time; in the woods after the falling of the acorns and beech-mast; in short, in every place where there is wild fruit, insects, and corn, to be picked up. They return home in the evening, well stuffed with all the insects they have swallowed, and clear the fields of the corn which has escaped the hand of the gleaner, a quantity of substance which would otherwise be absolutely lost to the farmer.

A girl, from twelve to fifteen years old, can easily manage a hundred turkey-poults, but she must not forget that as they have not attained their full growth, they would be fatigued by too distant rambles. No food makes their flesh whiter and more delicate than kitchen-stuff, or the dregs of melted tallow, more or less of which must be boiled according to the number that is to be fed; and being diluted in a boiling kettle, plants, and especially nettles chopped up, and pot-herbs, are mixed with it. The whole being well boiled, barley-meal or maize is added, to form a sort of paste, which may be given twice a day at least, in the morning and at one o'clock, when it is wished to render them fat. But as the dregs of melted tallow are not everywhere to be procured, the dregs or refuse of the oil of nuts, linseed, or sweet almonds, may be substituted; the greatest care being taken not to fatten them wholly with such oily substances, for their flesh would partake of the flavour and be injured.

Besides nettles and parsley, every plant which is allowed to possess tonic and nutritive qualities, agrees

particularly well with turkeys of every age; such as fennel, wild succory, and milfoil, which may enter into the composition of their food.

A scorching sun is fatal to turkey-poults, as well as rain; therefore intelligent turkey-keepers take care to lead their young flocks to pasture only during the moderately warm hours in the day, in the morning, when the dew is gone off, and in the evening, before it comes on; namely, from eight o'clock till ten in the morning, and in the evening, from four till seven. It is proper that turkey-poults should find some shade in their walk, and on the least sign of rain, haste should be made to turn them into their habitation, and to preserve them from the bad effects of cold damps.

FATTENING.

WHEN the cold weather approaches, or when the turkeys are about six months old, we must begin to give them better and more plentiful food, in order to increase their size and plumpness expeditiously.

To fatten them, if they have not an appetite sufficiently keen, they must be crammed, and kept in a dry, dark, airy place; or, what is better, let go about the out-houses, but without stirring out of the farm-yard. The following may be given to them for a month, every morning: boiled potatoes mashed, and mixed with the meal of buckwheat, maize, barley, or beans, according to local resources, made into a paste, of which they may eat as much as they can. Every evening, the remains of the

paste must be removed and thrown away, while the vessel in which it had been put must be thoroughly cleaned in the morning ; because, if the weather be warm, it may contract a dangerous sourness. A month after this food has been continued, there must be added to it, every evening when they go to rest, half-a-dozen balls of barley-meal, which they must be made to swallow, during eight days ; at the end of which they will be exceedingly plump, delicious, and weigh from twenty to twenty-five pounds.

In many parts, people do not take the trouble to breed turkeys, but buy them lean at market, when they have got the red ; and fatten them gradually, by giving them every scrap that can be disposed of. Females are easier fattened than males.

Every district has its mode of fattening turkeys, and everywhere it depends on local resources ; in one place it is acorns, beech-mast, and chestnuts boiled, and mixed with any sort of meal whatever, or the most common grain ; in another, as in Provence, whole walnuts are given to them, which they are made to swallow, one by one, by sliding the hand down the neck till they feel it has passed the gullet. They begin by one walnut, and go gradually on to as many as forty ; but many persons do not like this mode of fattening, on account of the oily rank taste it gives to the flesh.

It has been asserted, also, that it would be possible to fatten turkeys faster, and with less expense, by caponing them ; and that, besides, it would produce better and sweeter flesh. We are at a loss to know whether this

operation is anywhere in practice ; but, allowing it to be so, it must be attended by numerous accidents.

It is well known, that before the shooting of the red, that is, before they come to be six months old, the turkey chicks are so delicate, that the least injury they receive is mortal : how then could they support the most painful operation that nature can bear ? It is not known whether it would succeed when this critical time is passed. Experience must solve the problem, but we have heard that it has been attempted several times without success. Naturally gluttonous, turkeys fatten easily upon any food whatever, given in abundance, without its being necessary to have recourse to an operation easily performed on the fowl, but which cannot be performed without danger on the turkey.



Fig. 22.—The Wild Duck, or Mallard.

THE DUCK.

IN particular situations, it is very profitable to breed ducks, as where there is abundance of water they will find the greater part of their own living. Where there is no piece of water, such as a small lake, or large pond, or a canal, ducks will not thrive, and in such situations it is useless to attempt to keep them.

SPECIES AND VARIETIES.

THERE are numerous species and varieties of the duck, of great diversity of size and colour, though it is not usual to domesticate, except for curiosity, more than two or three of these. In the waters of the Zoological Gardens, many of these various sorts may be seen, and a few, such as the golden-eyed duck, in the water of St. James's park, and at several of the seats of country noblemen and gentlemen. As these, however, all require similar management, it will not be requisite to give separate directions here for each individual sort, and I shall therefore confine the details to the common mallard, and its tame varieties, and to the Muscovy duck.

The wild duck, or Mallard (*Anas boschas*), is a well-known native water fowl, by no means uncommon in most parts of the empire, and the original breed of our various domestic varieties. The wild duck feeds chiefly on young frogs, newts, fish, water insects, and the seeds of water plants. In winter, when the waters are frozen, flocks of wild ducks frequent woods and forests, in search of fallen acorns, of which they are peculiarly fond; and they also range over the stubble of corn-fields to glean the left corn. At this season they are gregarious, or at least keep together in families, but at the breeding season they separate in pairs, and retire to the most secluded piece of water they can find. The female makes her nest in a tuft of rushes, lining it with

down plucked from her own body. She lays about sixteen eggs, and sits thirty days, the drake watching in the vicinity the approach of enemies, but never assisting in hatching. When the young are excluded, they almost immediately take the water, and never return to the nest again, though the mother-duck will land in any convenient spot and warm them under her wings. They are full grown in six months.

The tame variety, most in request, is the dark-coloured Rouen, or Rhone duck, originally from France, but now sufficiently common. These ought to be of the largest size; for, if they are small, it is probable they are not far removed from the original wild-breed, and in that case will not only be very apt to stray away, but will be less prolific in eggs, though both the eggs and the flesh will be higher flavoured.

The English, or Aylesbury white variety, though handsome and strong, is inferior in flavour, the flesh being too light coloured and *chickeny*, as it is termed. Great numbers of this variety are, however, fattened in Buckinghamshire for the markets of the metropolis, where, in consequence of their large size, they fetch good prices.

The Muscovy duck (*Anas moschata*) is a distinct species, and not a mere variety, much larger than the common duck, and distinguished by a sort of caruncled red membrane, of a red colour, covering the cheeks, and extending behind the eyes, as well as by the musky odour exhaled by the rump gland. In a wild state, the drake is of a brownish black colour, with a broad

white patch on the wings, the female being smaller and more obscurely coloured. In the domestic state, it exhibits every variety of colour, like the common duck. "At one time," says M. Belon, "the male is white, at another, the female is white; in other instances, both male and female are black, and again, of great diversities of colour; but they are commonly black, variegated with other colours."—(*L'Hist. Nat. des Oyseaux*, p. 176, fol. Paris, 1545.)

The Muscovy duck is easily fattened, and a prolific breeder, and hence, though it is also a voracious feeder, it may be rendered profitable to rear. The male is very salacious, and pairs readily with the common duck, producing, by the cross, a hybrid, or mongrel breed.

This hybrid duck is incapable of breeding in-and-in, though the female will pair with the common duck, and thus produce a good sort. The hybrid has a deep green plumage, and is destitute of the red caruncled membrane on the cheeks, as well as of the musky odour of the rump gland of the Muscovy duck. Out of one hundred eggs of this hybrid sort, M. Puymartin was able to succeed in hatching scarcely twenty ducklings; and hence to keep up the stock, M. Olivier de Serres advises to continue crossing every year, by keeping a sufficient number of Muscovy drakes with the common ducks, such as one drake for every five or six ducks, setting the eggs under common hens. It may be necessary, also, if common drakes are kept, to confine those intended to breed hybrids, in a separate inclosure during

the breeding season.—(*Théâtre d'Agriculture.*) Muscovy duck is a corruption of musk duck, and the bird is a native of Africa.

THE DUCK POND.

IN order to keep ducks properly, a pond should be provided for them, if there be no water convenient ; and it is important, if the pond will admit of it, to have a small island in it, planted with rushes, osiers, and other aquatic plants and shrubs. “If you will preserve wilde ducks,” says Markham, “you must wall in a little piece of ground, in which is some little pond or spring, and cover the toppe of it all over with a strong net. The pond must be set with many tufts of osiers, and have many secret holes and creekes in it, for that will make them delight, and feede, though imprisoned.” —(*Good and Cheape Husbandrie*, p. 102.)

So far from advising to plant osiers and the like in a duck pond, the old Roman writers, Columella and Varro, direct quite the contrary. In the midst of the court netted in with wire or cord, as above mentioned, —“Yee must make,” says Mascall, “a ponde of two feete deepe, so long and wyde as the place will serve, and that the water there may run full continuallye to the brimme thereof, that the bankes may not be marde, and also made with plaister, and cimmond [cement] in the bottom, and all about the sydes paved with smooth stone, that *no weedes do grow therein*, but that the fowle may have cleer water still run thorow. And in the midst yee shall make a mount of earth, and thereon

sowe beannes of Egypt, and such other green herbes as commonly comes in water, to cover and hyde those fowle therein ; for some of them loves to be hid in tuftes of grasse, roses [rushes], sedge, and such : notwithstanding, yee muste not cover their holes, for the water muste be once in the day without weedes." —(*Husbandlie Ordering of Poultry*, c. 41.)

The netting may be dispensed with, and indeed if the pond be large would be too expensive, if care be taken to renew the breed when necessary. Mr. Heneage, at Compton Bassett, in Wiltshire, has a small pond in the woods adjacent to his mansion-house, where there is always a brood or more of mallards, more wild than tame, attached to the pond from having been reared there. When wanted for the table, they must either be shot or snared, as they cannot otherwise be taken. It is always easy to stock such ponds, by hatching fresh broods and rearing them there. In the water in St. James's park, the mallards are nearly tame, in consequence of being constantly fed, for amusement, by the persons who promenade there. They also breed in the islands, without being disturbed.

FOOD OF DUCKS.

DUCKS may be left to provide for themselves a considerable part of the year. They live chiefly on grain strewed about the poultry-yard ; the siftings and sweepings of barns, all sorts of mealy substances, the residue of breweries and boiling-houses, herbage, vegetable

roots, fruits; everything, indeed, suits them, provided it be rather moist. They are particularly fond of boiled potatoes; and these have been substituted with profit, for maize and barley. They are partial to being in meadows and pasture-ground, which might easily be covered with those sorts of plants which they are most fond of.

Every sort of flesh or offal is much to their liking, and forwards their growth admirably. The large, fine species, called the Rouen duck, answers well in the environs of Rouen, on the banks of the Seine, chiefly on account of its being in the power of the keepers to feed them with earth-worms, taken in the meadows, and which are portioned out to them three times a day, under the roofs where they are cooped up separately. This is what renders the ducklings so large, fat, and white, which are seen in Paris in the month of June.

Ducks are so very greedy, that they often endeavour to swallow a whole fish, or a frog, which heats them extremely, if they do not immediately throw it up. Particularly fond of meat, they eat it with avidity, even when it is tainted. Slugs, spiders, toads, garbage, insects, all suit their ravenous appetite. Among all the fowls of the poultry-yard, ducks are of the greatest service in gardens, by destroying a quantity of vermin, which usually do irreparable damage; but their voraciousness brings with it other inconveniences, which balance this advantage, except in the case of ducklings, which are not so apt to eat young plants and do other damage.

PAIRING AND LAYING.

ONE drake is said by M. Parmentier to be sufficient for eight or ten ducks, while Columella limits the number of ducks to six; and others to four or five.

In a wild state there is only one duck to a drake, and, therefore, we should say, the fewer the better, the chief difference of the tame duck from the wild arising from more abundant and regular food.

Ducks begin to lay towards the end of February, and sometimes earlier, but so far from laying the limited number of about sixteen eggs, some will lay as many as fifty, and even nearly double that number. They do not, however, usually continue to lay later than the month of May, unless they be very well fed,—the great secret for rendering them prolific, provided they do not become too fat.

At the laying season, ducks require to be closely looked after, inasmuch as they are not so easily brought to lay in the nests prepared for them as common fowls; but will stray away to hedges and other by-places to lay, and will even sometimes drop their eggs in the water. When they succeed in laying out their number of eggs without their nest being discovered, they will hatch them, and not make their appearance till they bring their young family home to the yard, except in cold raw weather: as ducks usually lay either at night, or very early in the morning, it is a good way to secure their eggs, to confine them during the period when they

must lay, a circumstance easily ascertained by feeling the vent.

It will accordingly be requisite at the approach of the laying season, in spring, to give them food in a particular place three or four times a day, to prevent them from wandering, and when once they can be got to lay in a nest prepared for them, they will probably continue to do so, without laying away.

Duck Eggs.—The eggs of the duck are readily known from those of the common fowl by their bluish colour and larger size, the shell being smoother, not so thick, and with much fewer pores. When boiled, the white is never curdy like that of a new-laid hen's egg, but transparent and glassy, while the yolk is much darker in colour. The flavour is by no means so delicate. For omelets, however, as well as for puddings and pastry, duck eggs are much better than hens' eggs, giving a finer colour and flavour, and requiring less butter; qualities so highly esteemed in Picardy, that the women will sometimes go ten or twelve miles for ducks' eggs to make their holiday cakes.

HATCHING AND CARE OF DUCKLINGS.

THE domestic duck is not naturally disposed to hatch, but in order to induce it so to do, towards the end of laying, two or three other eggs may be left in each nest, taking care every morning to take away the oldest laid, that they may not be spoiled. From eight eggs to ten may be given, according to the size of the

duck and her ability to cover them, taking particular care not to sprinkle them with cold water, as some authors wrongly advise. This precaution, at the best, is superfluous, if it be not hurtful. The duck requires some care when she sits; for as she cannot go to her food, attention must be paid to place it before her; and she will be content with it, whatever be its quality; it has even been remarked, that when ducks are too well fed, they will not sit well.

The first broods of the season are usually the best, because the heat of summer helps much to strengthen the ducklings; the cold always preventing the later broods from getting strong.

The duck is apt to let her eggs get cold, when she hatches. Yet Réaumur says, he had a duck of the common species, which only left the nest once a day, towards eight or nine in the morning; and before leaving it, covered the eggs over with a layer of straw, which she drew from the body of the nest, to screen them from the impression of the air. This layer, above an inch thick, secured the eggs so well, that it was impossible to guess that they were there.

But, every duck is far from giving the same proofs of so much foresight for the preservation of the warmth of the eggs, as this one was, and it often happens that they let them cool. The ducklings are no sooner excluded, than the mother takes them to the water, where they dabble and eat at the very first, and many of them perish if the weather is cold.

All these reasons often induce poultry-keepers to have

ducks' eggs hatched by hens or turkey-hens: and being more assiduous than ducks, these borrowed mothers take an affection for the young, to watch over which requires great attention; because, as these are unable to accompany them on the water, for which they show the greatest propensity as soon as they are excluded, they follow the mother hen on dry land, and get a little hardy before they are allowed to take to the water without any guide.

It is likely, that if a considerable quantity of eggs could be collected together, to make one large brood, the art of hatching chickens in an artificial manner, applied to ducks, would be attended with greater success than with chickens, as they are less difficult to rear. It would be sufficient to keep them shut up for twelve days in a duck-house made on purpose, and where it would be proper to leave a few buckets of water for them to dabble in; or a tank might be provided for them, the water of which might be kept slightly warm by the pipes used to heat the buildings of the poultry-yard. At the expiration of this time they might be set at liberty, and they would get on surprisingly, provided they had a pond or a little ditch in the inclosure, where they might be turned in, or a small rivulet running through it. Dambourney, whose whole life was spent in objects of public utility, thinks he remarked, that, until they have nearly crossed, a brood will not mix, neither on water nor land; each keeping apart, but without fighting, or appearing to hate each other. Ducklings can do without a mother as soon as they are

excluded. Their food, for the first days, may be crumbled bread sopped in milk, and a little ale, or cider. Some days after, a paste may be made for them with a bunch of nettle leaves, boiled tender, chopped up very small, and of a third of the flour of maize, buckwheat, or barley.

As soon as they have a little strength, a good deal of pot-herbs may be given them, raw and chopped up, mixed with a little bran soaked in water, barley, mashed acorns, boiled potatoes, beaten up with a little fish, when it can be had. All these equally agree with ducklings, which devour the different substances they meet with, and show, from their most tender age, a voracity which they always retain. To strengthen the young ones before they take to the water, they must be secured under coops, during eight or ten days, and taking care to put a little water under the coops.

When ducklings have been hatched under a common hen, or a turkey-hen, they are not allowed to go to the water till they become a little hardy, by remaining on land ; but the moment they see water, they naturally plunge into it, to the great alarm of their foster-mother, who cannot follow them ; a circumstance which has been remarked by the earliest writers, and is finely depicted by M. Rosset in his *Poeme de l'Agriculture*.

It is necessary, to prevent accidents, to take care that such ducklings come regularly home every evening ; but precautions must be taken before the ducklings are permitted to mingle with the old ducks, lest the latter ill-treat and kill them, though ducks are by no means

so pugnacious and jealous of new-comers as common fowls uniformly are.

FATTENING OF DUCKS.

ACCORDING to Gervase Markham, pulse, or any kind of grain, will fatten ducks or ducklings in a fortnight; but if he had tried this, he would have found that his recipe was not always successful.

Lawrence says that butchers' offal is excellent for fattening ducks, as it does not give the flesh the rank, disagreeable flavour which it always imparts to pork. Acorns, on the contrary, while they are good for fattening, injure the flavour of the flesh, and barley in any form is apt to render the flesh insipid, and woolly, or, as it is termed, chickeny.

As the duck is both a voracious feeder and fond of liberty, it will fatten very well when allowed to roam about, provided it has abundance of food; but it expedites the process of fattening, to have recourse to coops, quiet, and darkness.

Ground malt, mixed with water, is said to be an excellent food for fattening, though it must be by far too expensive.

In Lower Normandy, where great numbers of ducks are reared and fattened, the poulterer prepares a paste with the flour of buckwheat, made into gobbets, with which they are crammed thrice a day, for eight or ten days, when, though not full fat, they are sufficiently marketable to bring a remunerating price.

In Languedoc, when ducks have been rendered tolerably fat by being at large, they are cooped up by eights or tens in a dark place, whence they are taken out morning and evening to be crammed. This is done by a girl, who crosses their wings on her knees, opens their bill with her left hand, while with her right she stuffs them with boiled maize. Many ducks are suffocated by the operation, and killed outright, but their flesh is not the worse for the table, provided that they be immediately bled.

It requires a fortnight to complete the process, which increases the size of their liver enormously, and oppresses their breathing in a distressing manner. The sign of their being sufficiently fat is, when the tail opens like a fan, from the fat pressing on the roots of the feathers.

M. Puymartin says, he opened two ducks, one which had not, and one which had, been crammed; the first had the liver of the common size, the skin of uniform thickness, and the lungs sound. The second had a liver which filled nearly the whole of the belly to the vent, while the skin covering the liver was rendered very thick, and the lungs were swimming in blood. This duck was quite a ball of fat.

THE GOOSE.

THE goose, like the duck, is a native of this country, though it does not, we believe, commonly breed so far south, retiring during the breeding season to regions

farther north, such as Norway, Lapland, and Siberia, and returning in flocks in the autumn to feed on our rich stubbles, whence the name of Stubble-goose sometimes given to the wild goose. Unlike the duck, the wild goose is not very fit for the table, being, as many water-fowls are, of a fishy flavour; which, however, may be partially corrected by burying the body in the earth for several days before it is cooked, as we once saw done with a fine Solan goose, of which the flavour is still more fishy.

SPECIES AND VARIETIES.

THERE is only one sort of the common goose, though there are several varieties of the tame goose. The wild goose is of a brownish-ash colour, the individual feathers being lighter on the edge: the belly is snow-white. The tame varieties are of various colours, chiefly white, and all the various shades of grey. "The largest," says Markham, "is the best, and the colour should be white or grey, all of an pair, for pyed geese are not so profitable, and black are worse." The Embden goose, formerly so much prized, is very large, and both the male and the female of a pure white. The white varieties, indeed, unlike the white varieties of ducks, are always more delicate in flavour.

The Canadian goose, as well as several other species, are now bred in the Zoological Gardens, as well as by several private gentlemen, but require little peculiarity of management different from the common goose.

GOOSE-HOUSE, WATER, AND PASTURE.

COLUMELLA directs as most proper for geese to "have a large court, close paled or walled, of nyne foot hye, that no vermin may enter, and all about within the same to make alleys and galleries, with partitions and such chambers for one alone to sleep in and over the same, to set your house for them, made strong with stone or brick four foote square, plaste about your courte, and to eche house a close door for them to come in and out to lay, and also to shutte them in when ye shall have cause. Then, if there be not a ponde or river nye unto them, and to the house, yee must then make one, else to seeke their water farre off, which is not good, for geese that sitte must have water to bathe them when they rise from their neast, or else, as some say, their egges will not prosper. If there be no water, you must make a ponde, and clay it in the bottom for the water to remain; and make it somewhat deep, that they may plunge therein; for a saying is, a goose will not live withoute bathing and washing her often, no more than a beast without pasture."—(*Mascall*, c. 34.)

"All men," says Markham, "must understand, that, except he have either pond or streame, he can never keepe geese well."

Yet, if we are to trust M. Parmentier, the vicinity of rivers and ponds is not absolutely necessary to the most successful rearing of geese; for in districts destitute of these advantages, a small reservoir where they can bathe will be quite sufficient.

In France, geese are put up in thirties in the same lodge, with roofs and partitions to separate them, never allowing more than eight under one roof. All damp must be avoided, for geese at all times are fond of a clean dry place to sleep in, however much they may like to swim in water.

It is not a good method to keep geese with other poultry; for, when confined in the poultry-yard, they become very pugnacious, and will very much harass the hens and turkeys.

Columella advises to pasture geese in marshy or moist ground, and to sow for them vetches or tares, mellilot, clover, and fenugreek, but more particularly chicory, and lettuce, of which, he says, they are very fond.

"Grasse," says Markham, "they must necessarily have, and the worst and that which is the most useless is the best, as that which is moorish and unsavoury for cattell."—(p. 148.)

In allowing geese to range at large, it is requisite to be aware that they are very destructive to all garden and farm crops, as well as to young trees, and must, therefore, be carefully excluded from preserves and orchards. It is usual to prevent them getting through the gaps in fences, by hanging a stick across their breasts. This is equally easy with the barbarous practice of running a quill through their nostrils, or ringing them like pigs, as is practised in France.

FOOD OF GEESE.

DID geese require to be always fed in the poultry-yard, it would cost more than they are worth to keep them, for they are voracious feeders. All sorts of vegetables, food, and grain, agree with them, but they do not thrive well without grass. Cobbett says, the refuse of the cabbage of a market-garden would maintain a great many geese at a very small cost, but it is very doubtful whether they would keep long in good health, when fed either on cabbage, the leaves of mangold-wurzel, chicory, endive, lettuce, or other green food. This, indeed, is apt to render their bowels too open, and even to bring on scouring, unless alternated with boiled or steamed potatoes, given warm, or with the meal of oats, peas, beans, or maize, beaten up with boiled potatoes, carrots, or turnips.

The stubble fields of any sort of corn are excellent pasture for geese, for there they not only find grass and other herbage, but the corn which may have been scattered, and which would otherwise be lost ; while their dung, though at first acrid and apt to injure, will, when it has been mellowed, much enrich the ground.

PAIRING.

It has been ascertained, by M. St. Genis, that geese will pair like pigeons and partridges ; and, in the course of his experiments, he remarked, that, if the number of the ganders exceed that of the geese by two, and even by

three, including the common father, no disturbance nor disputes occur, the pairing taking place without any noise, and no doubt by mutual choice. Besides the common father, he left two of the young ganders unprovided with female companions; but the couples which had paired, kept constantly together, and the three single ganders did not, during temporary separations of the males and females, offer to approach the latter. He also remarked, that ganders are more commonly white than the females.

It is usual in books, as well as in practice, to assign six geese to one gander. In Languedoc, and some other places, it is a common practice with the small farmers who keep two or three geese, to keep no gander at all, but to turn their geese, at the breeding season, for a short period among the ganders of some larger establishment near them. This, however, must render the eggs of doubtful fertility, though, no doubt, it would not be practised, if it were found to be an unprofitable plan.

M. Parmentier recommends the gander to be selected of a large size, of a fine white, with a lively eye, and an active gait; while the breeding goose, he says, ought to be brown, ash-gray, or party-coloured, and to have a broad foot. The gray geese are supposed to produce the finest goslings, while the party-coloured ones produce better feathers, and are not so apt to stray from home.

Whatever care may be taken in selecting gray geese, with white ganders, Stephanus assures us, that a black sort will frequently be produced, which he says, "Are skant so fruitful as the other, nor so good to house;

wherefore, nourish as few blacke geese as ye may, for their flesh is not so good, being much dryer." And again—"They are better to be all white than gray, or mixte with two colours, and the blacke colour is worste of all, and of leaste goodnesse."—(*Mascall*, c. 36.)

LAYING.

WHEN well fed, geese will lay thrice a year, from five to twelve eggs each time, and some more, that is, when they are left to their own way ; but if the eggs be carefully removed as soon as laid, a goose may be made, by abundant feeding, to lay from twenty to fifty eggs without intermitting. They begin to lay early in spring, usually in March, and it may be known when an individual is about to lay, by her carrying straws about to form her nest with ; but, sometimes, she will only throw them about.

When this is observed, the geese should be watched, lest they lay in some by-place, and the eggs be lost. "Wherefore," says *Mascall*, "toward night, ye must take them up, and feele how many be ready to lay, which ye shall perceive if shee be nye laying, yee shall feele the end of her egge harde at her vent. Then shutte her up, and put her alone in a neast till she have layd, so she will seeke that place agayne to lay."—(c. 37.)

It is an essential precaution, *M. Parmentier* says, as soon as it is perceived that geese want to lay, to coop them up under their roof, where nests made of straw have been previously prepared. If they can once be induced

to lay in this nest, they will continue to do so till their number of eggs is completed.

In order to have early goslings, geese should be brought to lay early by keeping them in a warm, clean place, and feeding them on stimulant food.

HATCHING.

WHEN a goose, at the laying of each egg, is observed to keep in her nest longer than usual, it is a pretty sure indication that she is desirous of hatching. It is a popular but incorrect opinion, that a goose always knows her own eggs, and will not submit to hatch any others.

The nest for hatching should be made of straw, lined with hay, and from fifteen to twenty eggs will be as many as a large goose can conveniently cover.

The goose sits for two months, and requires to have food and water placed near her, that she may not be so long absent as to allow the eggs to cool, which might cause her to abandon her task. It is the practice of some to put vinegar in their water, and of others to lift them off the nests to make them drink, but neither of these is necessary.

It is an economical way of getting a great number of goslings, to employ turkey-hens to hatch. The common fowl has been equally praised for filling this important function ; but the eggs of the goose being very large, and their shell very hard, a hen is not bulky enough to hatch more than eight or nine. The turkey-hen, therefore, deserves to be preferred, because she can hatch fourteen

or fifteen. This function of the goose being thus filled by another, she is not kept from laying, and yields eggs in great abundance.

In the environs of Toulouse, where many hybrid geese are reared, increasing with the common duck and the large Muscovy duck, they give the eggs to the common fowl to hatch ; and to these are added two or three of the large-sized goose's eggs. The hybrid bird from this crossing conducts the goslings in a superior manner, and always walks at their head.

THE CARE OF GOSLINGS.

LIKE turkey-chickens, goslings are a month in hatching, and must be taken from under the mother, lest, if feeling the young ones under her, she might perhaps leave the rest of the tardy brood still unhatched. After having separated them from her, they must be kept in flat wicker pens, or baskets, covered with a cloth, and lined with wool ; and when the whole brood is come forth, the first hatched may be returned to the mother.

In Lincolnshire, according to Foote, when the eggs of the goose are on the point of being hatched, it is customary to break the shell a little, to give air to the gosling, and to help its coming out. Perhaps this practice, though dangerous to turkey-chickens, is less so to the goose's egg, whose shell is commonly very hard.

On the first day after the goslings are hatched, they may be let out, if the weather be warm, care being taken not to let them be exposed to the unshaded heat of the

sun, which might kill them. The food given them is prepared with some barley coarsely ground, bran, and raspings of bread, which are still better, if soaked and boiled in milk, or curdled milk, melilot, lettuce-leaves, and crusts of bread boiled in milk.

Afterwards, advantage must be taken of a fine warm sun to turn them out for a few hours ; but cold and rain being very hurtful to them, they must in bad weather be cooped up, and prevented from mixing with the larger ones, unless they have strength enough to defend themselves against any hostile attack, to which new-comers are usually exposed. To such goslings as are a little strong, bran may be given twice a day, morning and evening, continuing to give them this food till the wings begin to cross on the back, and after this, green food, which they are particularly fond of, may be mixed with it, such as lettuce, beet-leaves, and the like.

FATTENING.

LIKE other fowls, geese may be brought by proper management to a great degree of fatness ; but the period at which they are at the fattest must be chosen to kill them, otherwise they will rapidly become lean again, and many of them would die.

Geese may be fattened at two different periods of their life, in the young state, when they are termed green geese, and after they have attained their full growth. The methods at each period are very nearly the same.

For fattening green geese, Gervase Markham recom-

mends what he terms "slegge oats boyled," given thrice a-day with plenty of milk, which, he says, will fatten them well in a month. For stubble-geese, besides oats, he directs split-beans, with barley-meal and water, cooping up in a quiet, dark place, as is done with fowls.

The London feeders, when they receive goslings in March, begin feeding them on meal, from the best barley and oats, made into a liquid paste. They are afterwards fed on dry corn, to render their fat firmer. Full-grown geese are kept particularly clean, have regular exercise, and are fed with proportional quantities of dry, soft, and green food. Cobbett says, cabbage and lettuce alone will fatten young geese bought in the end of June; but we should doubt this to be sufficient without some good dry corn.

The writer of the article on Poultry, in Baxter's Library of Agriculture, recommends steamed potatoes, with a gallon of buck-wheat or ground oats to the bushel, mashed up with the potatoes, and given warm. This, it is said, will render geese, cooped in a dark, quiet, cool place, fat enough in three weeks.

M. Parmentier gives very copious details of the French methods of fattening. The whole process, he says, consists in plucking the feathers from under the belly; in giving them abundance of food and drink, and in cooping them up more closely than is practised with common fowls, cleanliness and quiet being above all indispensable. The best time is in the month of November, or when the cold weather begins to set in; if it is longer

delayed, the pairing season approaches, and prevents them from becoming fat.

When there are not many geese to fatten, they are put into a cask with holes bored in it, through which they may thrust their heads to feed ; and being naturally voracious, the love of food is greater than the love of liberty, and they fatten rapidly. The food consists of a paste, made of barley-meal, ground maize, and buck-wheat, with milk and boiled potatoes.

In Poland, a similar method is practised, the goose being put in an earthen pot without a bottom, and of a size not to allow the bird to move. The same food as that just mentioned is given in abundance, and the pot is so placed that the dung may not remain in it. The process is completed in a fortnight, and the geese are sometimes so increased in size that the pot has to be broken to get them out.

When the great number of geese to be fattened renders the preceding plan inconvenient and too expensive, they are taken from the stubbles or pasture, and cooped up twelve together, in narrow pens, so low that they can neither stand upright, nor move in any direction. They are kept scrupulously clean by often renewing the litter of the pens. A few feathers are previously plucked out from the rump and from under the wings. The portion of maize required for once feeding is boiled and put into a feeding-trough, with clean water in a separate vessel, and they are permitted to eat whenever they feel inclined. At the commencement, they eat a great deal constantly, but in about three weeks their appe-

tite falls off. As soon as this is perceived, they are crammed, at first twice a-day, and towards the end of the process, thrice a-day. For this purpose a tin funnel is used, with a pipe five inches and a half in length, and less than an inch in diameter, with the end sloped off like the mouth-piece of a flageolet, and rounded at the edge, to prevent its scratching the throat when it is introduced. A small round bag is adjusted to the pipe, through which grain is introduced into the crop. The operator sits squat on the ground, holds the goose with one hand, introduces the pipe of the funnel into the mouth of the goose with the other, and presses in the food till the crop is filled. Water is at the same time given to the geese to drink, and must always be left near them, as the cramming renders them very thirsty. A woman who is dexterous will cram ten geese in an hour. In less than a month, a goose may in this way be fattened to an enormous bulk.

In Alsace, a lean goose is confined in a small coop made of fir, narrow enough to prevent it from turning, while there is a place behind for passing the dung, and another in front to let out the head. Water is supplied in a trough in front, having some bits of charcoal in it to sweeten it. A bushel of maize is considered enough of food for a month. It is soaked in water the day before it is used; and the goose is crammed morning and evening, while it is allowed, during the day, to eat and drink as much as it chooses. About the twenty-second day, a quantity of poppy-oil is mixed with the maize. In a month it is seized with difficulty of breath-

ing, and a lump of fat under each wing indicates that it is time to kill it, lest it should be choked with fat, and die.

By this process, the liver of the goose is increased so much, that it will weigh from one to two pounds, and will besides yield about three pounds of fat, which is much employed in French cookery for dressing legumes, &c.

Among six geese, the fatteners commonly succeed with no more than four, and these generally the youngest. The Romans, who were fond of enlarged goose livers, were very careful to keep them quiet and in the dark. In some places on the continent, they nailed their feet to a board, burnt out their eyes with a hot iron, and kept them before a large fire, allowing them, however, as much water as they chose to drink; but these barbarous practices are now seldom resorted to.

M. Viléle found, by experiment, that geese fattened without cramming, cannot be brought to weigh above twelve or thirteen pounds, while by cramming, they can be made to weigh at least a third more.

THE SWAN.

SWANS are now kept, like the peacock, more for ornament than for purposes of economy, their chief use being for their feathers; for old swans are rarely,

if ever, brought to the table, though the cygnets, or young swans, are in some places fattened for the Christmas holidays.

The tame swan is very different from the wild swan, which is sometimes seen in this country, though it is by no means common.

The black swan of Australia is sometimes reared here, and may, in time, come to be bred more extensively. It requires little different management from the common swan.

The swan is very similar to the goose in its manner of life, but, when corn is near their haunts, swans will often devour the green blade, and do no little mischief.

Swans cannot be made to thrive without abundance of water to swim in, and clear water is to be preferred to that which is muddy.

In breeding, they require little attention, as they build their nests themselves in some island, or secluded spot, near water, where it is requisite that they be not disturbed. Indeed it is dangerous to approach them in the breeding season, as a stroke of their wing is so powerful, that it might produce serious bodily injury.

The female swan lays early in spring, like the goose, only once a year, and she has seldom more than three eggs, though, by means of plentiful food in a mild season, she will produce from five to seven, and even nine eggs. The male assists the female in hatching. The cygnets are dark when hatched, and do not become quite white till their second year.

The cygnets are fattened much in the same manner as geese, with boiled barley, soaked bread, ground beans, and old dried malt. They may either be cooped up, or suffered to walk abroad; but, if cooped, they must have abundance of water, and be kept very clean. They may thus be fattened in about six weeks.

DISORDERS OF POULTRY.

ALTHOUGH poultry are no less liable to disorders—many of them fatal—than cattle, or other tame animals, but very little attention has been paid to these, owing, no doubt, to the small value of individual fowls, compared with sheep, or horses ; and frequently it is most economical to kill them at once. These disorders, however, are far from being devoid of interest, not only as sometimes leading to correct views of the diseases of other animals, including man himself ; but so far as the saving of even a few shillings, by curing them when that is possible, or of rendering their eggs, or flesh, more wholesome and palatable, as well as the humane motive of adding to the comfort of the creatures, some attention to the subject, more than it usually attracts, is surely desirable. The following notices, though far from complete, and, not improbably, in several respects, requiring correction, will be found, it is presumed, both more systematic, and more full, than anything hitherto published in treatises on poultry.

It will contribute to distinctness, to consider the disorders to be noticed under the several functions and organs of the body which they affect, beginning with digestion.

DISORDERS OF THE DIGESTIVE ORGANS.

THE organs of digestion, which are usually considered as consisting of the mouth, the gullet, the crop, the gizzard, the stomach, the liver, and the intestines, having already been described in a preceding page, it may be convenient to consider the diseases affecting these organs in their order.

THE PIP, OR GAPES.

THIS is a very common, troublesome, and sometimes fatal disorder, among almost every sort of domestic birds, and particularly young fowls; and as M. Buc'hoz correctly states, it is most prevalent in the hot weather of August and September. It is considered variously by different writers. Dr. Bechstein describes it as a catarrhal inflammation, producing a thickened state of the membrane lining the nostrils and mouth, particularly the tongue. M. Buc'hoz, on the other hand, thinks it is caused by want of water, or by bad water, such as the drainings of dunghills, which fowls will drink when they can get no better; and sometimes, as I have remarked in my own fowls, from either heedlessness or laziness, to cross the yard where a vessel of clear water was placed for them. Others describe the disorder as beginning in the form of a vesicle on the tip of the tongue, whose contents, on becoming absorbed in a few days, occasion a thickened state of the skin. I have never myself observed this vesicle, but, should it be

found, the cure will obviously consist in pricking it, and discharging its contents.

The common and well-known symptoms are the thickened state of the membrane of the tongue, particularly towards the tip; and the breathing becoming thereby partly impeded, the beak is frequently held open as if gasping for breath, and becomes yellow at its base, while the feathers on the head appear ruffled and disordered. The tongue is also very dry; and while the appetite is not much impaired, the disordered fowl cannot eat, or but with considerable difficulty, and sits in a corner pining away.

The cure, at the commencement of the complaint, consists in the removal of the thickened membrane of the tongue; this is easily effected, by throwing the fowl on its back, placing the thumb in one corner of the beak, and the fore-finger in the other. The beak being thus held open, the membrane may be scraped or peeled off with the nail, or with a needle; and after the operation, the part may be anointed with oil, fresh butter, or cream, taking care not to let the fowl drink for a quarter of an hour afterwards. If the disease is in a more advanced state, which is shown by the chicken holding up its head, and gaping for want of breath, it should be thrown on its back, and its neck being held straight, its bill should be opened and the feather end of a small quill cut short should be pushed gently, but quickly, down the windpipe and turned round; this will loosen a number of small red worms that are in the windpipe, and some will be drawn up by the feather, and others

thrown up by the chicken, which the feather will make sneeze. The operation should be repeated the following day, if the chicken continues to gape; and if it does not gape, it is proof that it is cured. When chickens die of this disease, the windpipe and crop will be found full of small red worms, by which it has been choked.

When chickens are ill with the pip, it is generally thought best to give them some lettuce or parsley chopped very small, mixed with their ordinary food, to prevent costiveness, which is otherwise common in this complaint; but Dr. Bechstein recommends keeping the fowl in a warm place, and a mixture of butter, pepper, garlic, and scraped horse-radish, to be given to it, without stripping the tongue; and, when the nostrils are obstructed, to pass a small feather, dipped in oil, up them. M. Buc'hoz recommends clean water.

THIRST.

IMMODERATE thirst is a symptom of fever, though it may also occur when there is no fever, from a long continuance of dry food, and particularly when the crop and gizzard have been distended by over-eating. When fowls are much persecuted by their companions, which is an every-day occurrence in the poultry-yard, they may accordingly be observed to drink almost insatiably, for a day or more at a time, eating very sparingly, and sometimes not at all. This appears to operate as a cure for the fever into which they have been thrown; at least, I

have observed them to recover rapidly in flesh and feather after such immoderate drinking.

When immoderate thirst is observed to affect a number of fowls at the same time, they ought to have a good supply of green or moist food, such as cabbage or lettuce leaves, soaked bread, or boiled potatoes, mashed with skimmed milk ; taking particular care that this milk be perfectly sweet.

When the thirst arises from fever caused by fighting, the fowl may be soured into a pail of water in summer ; but in winter this must only be done if there be convenience to let it dry itself near a fire or a stove.

VORACIOUS APPETITE.

FOWLS which are much emaciated, or affected with loss of feathers (not moulting), often exhibit the most voracious and insatiable appetite, while at the same time they are very ill-tempered and pugnacious. This most probably arises from acidity in the bowels, or some obstruction in the orifices of the veins that open on the inner surface of the intestines, preventing the due passage of the digested aliment into the blood.

Before any proper remedy can be prescribed, the cause ought to be ascertained, but as this is not always possible, it may be well to try various things at a venture. For instance, as acidity may be presumed to be the cause in a great number of instances, chalk may be mixed up with bread crumbs or mashed potatoes, to neutralise the acid. Again, if costiveness is observed, which may cause

obstruction, mashed carrots or boiled cabbages or greens may be given two or three times, till the effect produced be ascertained.

CROPSICK, INDIGESTION, OR WANT OF APPETITE.

WHEN the food of fowls is suddenly changed, such as from dry oats to boiled barley, or to mashed potatoes, they may often be observed to feed badly, and to lose flesh in a surprisingly short space of time. It will tend much to prevent this, if care be taken never to give them the boiled barley or potatoes in a cold state, the difference of effect of warm instead of cold food being quite wonderful; fowls enjoying a hot dinner, and disliking a cold one (dry grain or meat excepted) as much as an alderman would enjoy hot, and dislike cold, turtle.

But although change of diet may often produce such temporary fits of indigestion, these are seldom of serious consequence, and usually disappear in a day or two. It is very different, when an individual fowl is affected with indigestion or want of appetite of some continuance. In that case, the causes ought to be investigated, and remedies given accordingly. A hen of the Spanish breed, about five years old, was the particular favourite of a cock which had to be confined in consequence of his savage behaviour to another hen. From this time, the favourite pined, kept constantly beside the coop of the prisoner, and at length left off feeding almost entirely. When the cock was liberated, it was supposed the favourite would recover her spirits and appetite; but

though the cock was as gallant to her as before, she continued to mope, to keep away from the rest, never took to feeding with any appetite, but only gathered up a few grains of corn now and then in a listless manner, as if she cared little about it, and finally in a week or two she died. It is not improbable, however, that if she had had active medicine given her, such as pepper, or iron-rust mixed with mashed potatoes, or been well purged with mashed carrots or boiled cabbage, she might have recovered.

Mowbray mentions a hen which sat about in corners, neither ate, drank, nor evacuated, and yet looked full, and not diseased. Her crop being totally obstructed, on an incision being made from the bottom upwards, a quantity of beans was found, which had vegetated there. On the wound being stitched up, it immediately healed, and little inconvenience remained.

Iron rust, either given in substance mixed with soft food, or diffused in water, is one of the best tonics for fowls, and ought never to be neglected, when there is any atrophy or loss of flesh observed. It ought of course to be combined with good barley or oats, or ground malt, and occasionally some good ale, milk-warm, to drink. The ale has a very great effect in improving what may be termed the condition of fowls.

COSTIVENESS.

It is easy to discover the presence of this disease, by the frequent unsuccessful endeavours of the fowl affected

with it to relieve itself. It may be caused by a continuance of feeding on dry grain without access to green vegetables, without which, or the occasional substitute of warm boiled potatoes, this disorder is certain to make its appearance. The want of a plentiful supply of good water may also occasion costiveness, fowls being, as above explained, differently constructed to quadrupeds, which make water through a channel distinct from the vent-gut or *rectum*.

Soaked bread with skimmed milk, if it can be easily had and given warm, is one of the best remedies we know for the costiveness of fowls, as it does not purge so much as boiled carrots or cabbage, which may be given if the soaked bread fail. A good meal of earth-worms, or some chopped suet, may also be useful. Hot potatoes, mashed with dripping or bacon fat, are likewise an excellent remedy.

But should any individual fowl continue costive, notwithstanding these means, a little sweet oil may be introduced into the anus, by way of clyster, a thing that will rarely fail to effect, at least, temporary relief; and a permanent cure must be sought for by discovering the causes.

SCOURING, LOOSENESS, OR DIARRHŒA.

WHEN fowls are observed to dung more loose than natural, in consequence of feeding on green vegetables, bad potatoes, or other soft food, it can scarcely be reckoned a disease, and no treatment will be required,

unless it continue or increase, rather than go off. But when it does amount to a confirmed looseness, it ought to be attended to, lest in the end it prove fatal, as not unfrequently happens when it is neglected. The worst symptom is the voiding of a white calcareous matter, sometimes streaked with yellow, like the yolk of a stale egg, which sticks to the feathers round the anus, and being very acrid from the ammonia it contains, soon causes inflammation, which extends rapidly upwards into the bowels. When the disorder continues violent for a short time, it rapidly emaciates the fowl, as the same disorder does other animals.

As it is in most, if not all, cases caused by a superabundant acidity, or other irritating matter in the bowels, chalk may be given, mixed with boiled rice and milk, either to neutralise any acid that may be present, or to soften any acrid matter. Some people pull out the vent and tail feathers, and then rub the parts with fresh butter; though this is not only a very cruel operation, but one very little likely to prove effectual. Dr. Handel of Mayence, in cases of chronic or long-continued looseness, prescribes water in which the rust of iron is diffused, mixed with milk, for drink, and says, it seldom fails to effect a cure. Great care must be taken, however, to have the milk perfectly sweet. The sulphate of iron, or what appears still better, alum, might perhaps be tried with success, dissolved in water in such proportions as to make it taste a little rough to the tongue.

As looseness may be caused in fowls by an excessive

discharge of urine from the kidneys, this, if discovered, must be attacked by giving dry food, such as whole wheat, oats, bran, or buck-wheat, and by supplying water sparingly. Boiled rice and milk, which is strongly diuretic, as well as the rust water, will then be improper.

BLOODY FLUX.

FOWLS are but rarely affected with this complaint, which not unfrequently proves fatal to parrots. Boiled rice and milk, and mild ale, warm, with a little chalk or magnesia, should be given. Fat broth or sweet milk, warm, should be their only drink.

ORGANS OF RESPIRATION IN FOWLS.

FOWLS, in a state of health, rarely breathe through the mouth as we do, but almost always through the nostrils, which are comparatively large, and communicate backwards with the top of the wind-pipe. The wind-pipe itself is composed of stiff rings of cartilage, united by strong membranes; and such is the elasticity of these, that the tube is enabled to preserve its cylindrical form, even when it receives considerable pressure, and thereby affords free ingress and egress to the air in breathing.

When the wind-pipe descends into the chest, it divides into numerous branches, which, gradually becoming smaller, at length terminate in perforations, but neither these branches nor the cells are so small in fowls as in other animals. It is these branchings of the

wind-pipe, however, which, together with numerous blood-vessels, make up the substance of the lungs, the interstices being filled with a fine membrane that serves not only to unite them, but likewise to give a uniform appearance to the whole mass. The perforations in which the branches of the wind-pipe terminate, lead into large air-sacks communicating with all parts of the body, and forming an accessory lung.

With reference to a not uncommon disorder among fowls, it is important to mention that the lungs are covered with a fine delicate membrane called the *pleura*, on every part of which a watery fluid is secreted, for the purpose of preventing a cohesion of the parts.

OBSTRUCTION OF THE NOSTRILS.

FOWLS, as already remarked, do not in general breathe through the mouth, but through the nostrils, and consequently, when these through any cause become obstructed, the bird may be observed to gape and pant for breath. This is the case in the *pip*, as mentioned above, and it is also a very common consequence of the wounds received in skirmishing and fighting, the blood from the lacerated comb trickling over, and plugging up the nostril with a hard adherent crust. When this is observed, the parts ought to be washed with warm water till the crust can be loosened. If the obstruction arise from canker or ulceration of the nostril itself, it may, if recent, be rubbed with a little honey to defend it from the air; but if of long standing, and not

seeming likely to heal, it may be touched with a red-hot wire, which will produce a scab, and in most cases be followed by a speedy cure. This may be considered by some a very barbarous remedy ; but the pain it produces can only be momentary, and in reality is not so severe an operation as cupping. In the case of obstructed nostrils from pip or catarrh, bathe them with warm milk and water, or anoint with sweet oil or fresh butter.

ROUP, OR INFLUENZA.

THE term *roup* is in common speaking very indefinite, being applied to quite dissimilar disorders of poultry, such as to obstruction in the rump gland, the *pip* already described, and to almost every sort of catarrh. It will be most advisable, I think, to confine the term to a highly dangerous disorder, caused partly, if not altogether, by cold and moisture, but usually ascribed to improper feeding, uncleanness, and confinement.

The symptom most prominent in the roup, is difficult and noisy breathing, beginning with what is termed the gapes, as in the pip. The eyes afterwards become much swelled, and the eyelids livid, with decay of sight, and even total blindness. There is a considerable discharge from the nostrils, and even from the mouth, at the commencement thin and limpid, but afterwards becoming thick, purulent, and fetid very similar to the glanders in horses. As secondary symptoms, the appetite is all but lost except for drink, the crop feels hard to the touch, and the feathers are staring, ruffled, and without

a healthy gloss. The fowl sits moping and wasting in corners, always apparently in great pain. Mowbray says, that in a hen which died of roup, the eggs were black.

The roup affects fowls of all ages, and is either acute or chronic, beginning sometimes suddenly, and sometimes gradually, as the result of neglected colds, or rainy weather and damp lodging. Chronic roup has been known to affect a fowl for two years.

When any fowls or other poultry are observed to be infected with roup they ought to be kept warm, and have plenty of water and scalded bran or other light food. The most effectual remedy is said to be antimonial powder or calomel, in grain doses, made into a pill with bread. When it becomes chronic, change of food and of air, if convenient, will be advisable; such as confining the diet to earthworms for a week, and then keeping wholly to grain for another week, and again to hot mashed potatoes for a third week.

The common remedies, which are but rarely efficacious, are rather less than a tea-spoonful of salt dissolved in water; or rue and garlic beaten up into a mass with butter, and crammed down the fowl's throat.

Cleanliness is no less indispensable than warmth, and it will be convenient to bathe the eyes with warm milk and water, or with Labarraque's disinfecting liquid, which is a solution of chlorinated lime.

CASES OF ROUP.

THE following cases of roup are from an intelligent Middlesex farmer. A cock about four or five months old, apparently turned out by somebody to die, came astray, and was in the last stage of roup. The discharge from his mouth and nostrils was very considerable, and extremely pungent and fetid, while his eyes appeared to be affected with inflammation as bad as what surgeons term Egyptian ophthalmia. The roup, it may be stated, was somewhat prevalent at the time, and a very fine cock had perished in a corner hard by of cold and hunger from not being able to eat. The roupy cock was placed by the fire-side, his mouth and nostrils washed with warm water and soap, which made him expectorate and sneeze off a quantity of the offensive obstructing matter. His eyes were washed with warm milk and water, and the head gently rubbed with a dry cloth. As he could not see to eat, he was put into a rabbit-hutch, with a warm bed of hay to squat on. Some hours afterwards, his head was again washed, and as there was much intermittent fever, though the cold stage prevailed, a stimulant plan was adopted. Long pellets were formed of barley-meal, flour, mustard, and grated ginger, with which he was crammed several times a day, his head bathed, and warmth attended to. He had milk-warm water, sweetened with treacle, to drink, for the purpose of counteracting the too heating qualities of the stimulants. The fire-side always seemed

to invigorate him ; yet he still breathed with difficulty and gaped, and had a rattle in his throat.

In three days, the stimulants, warmth, and cleanliness, improved him so much that he began to see a little ; and in a week his sight was nearly perfect. A little mustard was still given him in his water, and then some flowers of sulphur. He had also a pinch of calomel in some dough. He was gradually brought out so as to season him to the cold ; and in a month, was in high health and spirits.

Having moulted late, he caught a cold at the first frost, and suffered a relapse, having cough, gaping, ruffled feathers, and agueish shaking. Warm lodging, and occasionally a lounge by the fire-side, proved a speedy remedy without medicine.

Amongst a lot which the same farmer had purchased, was a white hen, which appeared pale about the wattles and unwell, probably from cold caught by being carried about in the higgler's basket. The eyes became violently inflamed, with swollen livid flesh around them. He bathed the eyes with brandy and camphorated spirit, and sometimes with salt and water, and by this means soon reduced the swelling, but the flesh remained pale and unhealthy. Black pepper also was once tried with good effect. The disorder almost disappeared, but she had frequent relapses, and on a sudden change of weather ensuing, she began to exhibit all the symptoms of infectious roup, so bad, that it was deemed necessary to kill her. In a few days after, the cock, mentioned in the first case, was affected with gaping and other incipient

symptoms of the same disorder, giving rise to a suspicion that he had caught it of the hen. He was, however, speedily cured as before.

During cold north-east winds, the same intelligent farmer found that all his fowls became thin, sickly, and pining, while the slightest change of the wind to the south-east, with sunny days, revived them. In the first instance, when the winds were cold, the large chickens were lean, and weighed very light, being rousy and blind in a similar manner to sheep from the same causes. Very wet or very dry weather, or extremes of cold or of heat, are equally fatal, whereas, when the weather is genial and equable, fowls always thrive best. The old poultry, in the meanwhile, frequently bear all changes of weather, without showing any symptoms of roup. In this, there appears great similarity to human disorders, children and young people being more readily subject to influenza, which resembles roup, than those who are grown up, or elderly.

A sharp north-west wind occurring in the beginning of September, was observed to have a remarkable effect even on full-grown fowls, as they were soon seized with roup, with staring feathers and fetid discharge from the nostrils. The only certain remedy was warmth, and all of them might probably have been cured in a hot-house.

COLDS, CATARRHS, AND PULMONARY CONSUMPTION.

HOARSENESS, sneezing, and other symptoms of cold, are very common among fowls, which are more susceptible

of cold than might be imagined, when we consider their warm clothing of feathers. When it is considered, however, that the air taken into their lungs is not, as in ourselves, stopped there, but by means of the air-cells reaches every part of their body, penetrating even into the interior of their bones, we may wonder the less at their great susceptibility of being affected by changes of temperature. It must be considered, also, that fowls are originally, like the domestic cat, natives of a tropical climate; and though, like the cat, long naturalized, they still retain so much of their original habit as to influence them in this respect. It is besides a very common thing for individuals to be rendered more susceptible of changes of temperature than they otherwise would be, by being closely confined in coops by dealers in the markets; and hence, when purchased and turned out into the fresh air of an open field or of a farm-yard, they frequently, to use a common phrase, "catch their death of cold" within a few days.

M. Flourens, a very distinguished physiologist of Paris, has investigated the nature of the disorders produced in fowls by cold with great care, and as his observations are not only apposite, but, so far as I know, new to the English reader, I shall give them pretty fully. M. Flourens did not confine his researches to fowls, but experimented likewise on ducks, which he found, conformably to general experience, no less susceptible of catarrhal disorders than fowls, proving that it is not altogether a tropical origin which causes such susceptibility.

M. Flourens * being in the country in the month of May, his attention was called to a duckling of a brood newly hatched, which was reported to have swallowed something that stuck in its throat, appearing to be on the point of suffocation, continually opening its broad bill, and breathing with extreme difficulty. He examined the fauces, the wind-pipe, and the gullet, and found nothing ; but the struggles of the little creature continued to increase, and it finally died in an hour or two. On opening it, no foreign substance was found, either in the gullet or wind-pipe ; but the lungs were of a deep red, and gorged with blood, showing that its death had been caused by acute inflammation of the lungs.

Another duckling of the same hatch was pointed out to M. Flourens, which had been suddenly seized with symptoms similar to the preceding ; and while he was examining this, a third was struck so suddenly with oppression of the chest, that it stood motionless, gasped for breath, had violent palpitation of the heart, left off eating and drinking, and died in two or three hours, as did the second one. He opened both, and found the same inflammatory engorgement of the lungs which he had observed in the first. The disorder indeed was evidently acute inflammation of the lungs.

The terrace where he found the ducklings thus seized, and which was badly situated for rearing poultry, had a northern aspect, and the sun scarcely reached it. It

* Annales des Sciences, Sept. 1829.

was consequently cold, and cold alone seemed to be the cause of the pulmonary inflammation in the ducklings. To try the effect of a warmer exposure, M. Flourens caused the remaining ducklings of the hatch, seven in number, to be removed to a poultry-yard, having a southern aspect, and perfectly exposed to the sun. Upon carefully warming the little creatures, the inflammation disappeared from the chest, and did not return. All the seven ducklings lived and grew up to adult age.

In 1824, M. Flourens had carried into his room, the better to protect it from cold, a fowl, which he had studied with great care for many months. It was so pleased with heat, and impatient of cold, that when placed near the fire, it remained quiet and tranquil; but no sooner was it removed to a distance, than it manifested disquietude and suffering, going from one side to the other, till it contrived to get as near the fire as possible, sometimes even so as to singe its feathers. When it was near enough to feel the influence of the heat, it lay down on its side, extending the wing on the upper side, and raising its feathers to permit the penetration of the warmth, as fowls often do in the summer sunshine. If the fire chanced to go out, the creature drew nearer and nearer as it became low, and at length squatted down over the cinders. In November it died, and its lungs were found inflamed, gorged with blood on several points, and in others in a state of suppuration. The following year, M. Flourens likewise lost, in the beginning of December, another fowl and a duck,

which he had kept from the month of July. On opening these two birds, he found that, like the preceding, they had died of inflammation and suppuration of the lungs.

The effects of cold, so determined and constant towards the lungs, and the various degrees of inflammation, acute and chronic, produced by it under his eyes, induced M. Flourens to think, that he had thereby direct means of investigating, experimentally, the nature of pulmonary consumption, one of the most fatal diseases incident to man, and resolved to take every means for this purpose. The following experiments appear to have been performed in May:—

“I soon procured,” says M. Flourens, “a new hatch of eleven ducklings, eight days old, which I divided into three parties. At ten o’clock in the morning, three were taken to the terrace having a northern aspect, where I left them, or rather, intended to leave them, till four o’clock in the afternoon; but two of them died in two or three hours, and the third was found dead the next morning in the basket where it had slept. All the three had died of acute inflammation of the lungs. Three others were constantly taken to the poultry-yard with the southern aspect, and kept there during the finest part of the day, and all the three grew up to adult age. The five others were alternately taken to the southernly poultry-yard, and the northerly terrace, so as to pass about an hour in the one, and an hour in the other. I intended in this way to produce, by the action of interrupted cold, a chronic inflammation of the

lungs ; but they all died of acute inflammation, like the three preceding, only dying a day or two later.

“It was evident that the tender age of the creatures was the cause of the sudden effects of cold, even when the cause was interrupted ; and though I was then consequently very desirous of having older ducks, there were none to be had. The warm season also was advancing, and I put off my experiments till the return of cold weather.

“In the beginning of October, 1826, I procured a brood of twenty-three chickens, about a month old. As soon as the cold weather appeared, I placed six of these in a suitable place, where I kept up a mild temperature during the day, and at night I made them sleep in baskets warmly covered. None of these six chickens, among which were four females and two males, were affected with consumption of the lungs ; but one died of a disorder of the eyes, and another lost an eye.

“Of eleven chickens which I kept constantly in the poultry-yard with a southernly aspect, all, except two, a hen and a cock, died before the end of December, of consumption of the lungs, having first passed through all the stages of this disease.

“Those chickens which at the end of October were still lively and gay, lost by little and little their strength and vivacity ; they trailed their wings, ruffled up their feathers, their flanks fell in, they chirped almost incessantly, their voice changed progressively, becoming first hoarse and at length aphonous ; they scarcely ate, they

grew extremely emaciated, with the skin dry, and as if it were glued to the bones ; they endeavoured to get in doors for shelter, and when they did get in, they were observed to approach as near as they could to the fire, to sit down even on the cinders and even upon the dogs and cats around the hearth.

“ On the death of these creatures, I found their lungs in different stages of inflammation and of suppuration. For the most part, the larynx, all the windpipe, and its ramifications through the lungs, were filled with purulent matter of a greyish colour like mud, and of a fetid smell. This matter was sprinkled all over (*parsemée*) with a multitude of very minute black points, and these when thrown into water fell to the bottom. The lungs at certain points were gorged with blood, and their tissue, softened as if putrefied, was of the colour of wine lees. At other points, particularly the external posterior margin, the pulmonary vesicles presented black points like those in the purulent matter, and in many of these black points I found a very minute substance, hard, crepitating, white, and of a bony or horny appearance. In fine, upon other points, I observed the vesicles corroded, and forming small sacs filled with the pus found in the bronchia, the wind-pipe, and the larynx.

“ As to the two surviving chickens, they no doubt withstood the cold from being better covered with feathers than the others, but they remained dwarfed and feeble.

“ There remained six chickens more out of the twenty-three on which I had begun my experiments.

The following is what I did with these:—I left them at first with the eleven in the poultry-yard till they exhibited symptoms, not to be mistaken, of pulmonary consumption more or less advanced. I then took them to the place kept at a mild temperature, where, after marking them with bits of stuff tied to their legs, I united them with the six already there.

“Two of these chickens, which would certainly have died the same day or the next, if I had left them in the poultry-yard, after having appeared at first to regain a little strength, died, one in about five and the other in about nine days. I found their lungs in a complete state of suppuration or of inflammation.

“The four other chickens regained by degrees their vivacity and vigour, recommenced feeding with a good appetite, and appeared completely re-established in health, and in April, 1827, when I released them all from confinement, they appeared as healthy as those which had never been exposed to the cold.

“Among these four cured chickens were three cocks, which I sacrificed to ascertain both what might be the actual state of their lungs and what could have been the state through which these organs had passed during the evident symptoms of phthisis which I had previously observed them to present—symptoms of which the most immediate and direct is the purulent matter observed to come from the glottis, on drawing the tongue out from the mouth and pressing upon the larynx or the wind-pipe.

“I opened accordingly the chest of the three cocks,

and I found in all the three traces of an old change in the lungs, more or less deep, and now healed.

"I preserved the hen, which I intended to lay eggs by means of which I purposed to study the effects which reproduction might have on a pulmonary consumption when cured; but my return to Paris prevented me from putting this design in execution.

"I preserved in spirits one of the cured lungs, of which the entire lobe presented only hollow and depressed vesicles, where may still be traced the black points they had contained during the course of the disorder.

"From these observations," M. Flourens concludes, "with respect to the effects of cold upon fowls, it follows:—

"1. That in these creatures, cold exercises a constant and determined action upon the lungs.

"2. That this action is more sudden and more serious in proportion as the creature is of tender age.

"3. That when cold does not produce a pulmonary inflammation, acute and speedily fatal, it produces chronic inflammation which is in fact pulmonary phthisis.

"4. That warmth uniformly prevents the access of pulmonary phthisis, and as uniformly suspends its progress when this has commenced; and sometimes even stops it entirely, and effects a complete cure.

"5. That this disease, at whatever stage it may have arrived, is never contagious. The chickens affected with phthisis were not only the whole day with

the healthy chickens, but roosted at night in the same baskets, without ever having experienced the slightest influence from a communication so intimate and so prolonged.

“ A long series of observations made upon man has unquestionably proved that cold is the most terrible scourge in producing chronic inflammations of the lungs ; while heat, on the contrary, is the most efficacious remedy. The experiments above detailed confirm, in a direct and decisive manner, both the pernicious effects of cold and the salutary effects of heat. In showing this last evidence, accordingly, both where the source of the evil lies and where is the source of the benefit, the results may not be entirely useless to humanity.”

The observations of an intelligent Middlesex farmer agree precisely with those of M. Flourens respecting the influence of the weather. In July, for example, he tells us that when sudden rain followed hot weather, the mortality among chickens was very remarkable, large young cocks and pullets wasting away, and becoming so ill, that it was said in the neighbourhood there was a chicken plague. This was occasioned by the weather, beyond all possibility of doubt, as it was partly prevented by shelter. By the beginning of August he lost a full score of chickens.

Again, sudden very hot weather produced bad effects on all his chickens, and it being impossible to doctor all, the most advantageous plan, he judged, and the least troublesome, was to destroy all the sick ones and calcu-

late only on the strong, exercising judgment in the selection ; for even when they are cured, they frequently remain not only lean but voracious, destroying a great quantity of food, and showing no sign of thrift till late in autumn. When extensively-spreading disorders attack the chickens of a yard in this way, unless shelter and housing prove effectual, little else can be recommended.

In the cure of these disorders in fowls, as well as in man, the most inert and unphilosophical remedies have been recommended. Dr. Handel of Mayence, for example, recommends, for the pulmonary consumption of fowls, the juice of the white turnip to be given for drink instead of water, which of course could have no more effect in curing the corroded lungs, gorged with pus and studded with black points, in chickens, than balsam of horehound, pectoral elixir, and all the farrago of stuff lauded for consumption in man. M. Flourens was too sound a reasoner to dream of trying nostrums on his chickens, since temperature alone seems to be the dominant principle to which all attention ought to be paid. After perusing his experiments, our readers need not be recommended to take care that their poultry be well sheltered during the colder seasons of the year, and if any appearance of cold or inflammation be observed, to remove them at least for a time to some well-sheltered place, or even into some artificial temperature.

ASTHMA, OR BROKEN WIND.

THIS is a very common disease among fowls, characterised by their breathing short, opening their beaks often and long, as if to gasp for air, with heaving and panting at the chest, more particularly when agitated or frightened.

There seems to be two species of the disorder. In the first, it frequently happens that when the action of the blood-vessels of the lungs has been increased to a great degree, and the inflammation produced terminates without suppuration or gangrene, phlegm is frequently thrown into and plugs up a part of the air-cells, which prevents them from performing their proper functions ; and the fowl, not being able to take in the usual quantity of air, is obliged to inspire twice in the time which before only took up one inspiration, causing a double heaving of the chest. The capacity of the lungs being of course diminished, the membrane which lines the windpipe is much thickened, and many of the finer branches are probably obstructed in a greater or less degree.

In the second variety, by fright, from chasing the fowls to catch them, or by seizing them suddenly, or by their fighting with each other, a blood-vessel is not unfrequently ruptured, as is proved by a drop of blood appearing at the beak, speedy death being the usual consequence. If this does not happen, the breathing continues difficult and apparently painful, and a com-

plete cure is rarely effected. The rupture, not of a blood-vessel, but of one or more of the air-cells, occasions considerable vacuities, which are never completely emptied of air on expiration. When this is the case, the fowl not being able to expel the air at one expiration, another immediately takes place, with a short inspiration between, causing the panting and gasping already mentioned.

Confirmed asthma, caused by the bursting of air-cells or blood-vessels, is of course incurable, though it is not always fatal—fowls so affected often living for several years, otherwise in tolerable health. It certainly, however, injures the utility of cocks, which are the most subject to it from its being brought on by fighting. I had one last autumn which often breathed so thick, or roared, as a farrier would say, that he might be sometimes heard at the farther end of the yard ; but although he moulted freely and well, he seemed to have entirely lost his reproductive powers ; but this might be in consequence of years, as I do not know what his age was exactly. He was killed for the table, and though not fat, was well-flavoured and tender. This short breathing rendered him incapable of standing his ground in a skirmish ; but the person I had him from represented him as very pugnacious, and it was probably by fighting that he had some part about his lungs ruptured.

ORGANS OF CIRCULATION IN FOWLS.

THE heart in fowls, as in man and quadrupeds, consists of two ventricles for throwing the blood into the arteries,

one to be distributed to the lungs and the other through the rest of the body, and two auricles for receiving the returned blood.

The blood is composed of a yellowish substance termed *serum*, and a red-coloured mass.

DISORDERS OF THE BLOOD.

THE chief disorders of the blood, worthy of attention in fowls, are fever and inflammation.

FEVER.

THE chief symptom in fever of fowls is increased rapidity of the current of the blood, and this of course may be occasioned by various causes. One of the most common is skirmishing and fighting, by which the creatures are often greatly agitated, and not unfrequently are killed outright. This fever is sometimes increased, by buffing the combatants about with a handkerchief, to induce them to leave off. A more effectual remedy, which at the same time will often stop the fever, is to plunge them over head in cold water, or throw cold water over them from a garden pot, or even from a bucket. If this is done, care must be taken to have them dried as soon as possible, by removing them within doors, should the weather be damp or cold.

In a case of highly inflammatory fever in a chicken, supposed to have been caused by sudden hot weather in May, so that it burned the hand like hot water, a dose

of nitre, in milk and water at night, produced so great a change, that the chicken was cool and brisk in the morning. The dose was repeated, and brought on a cold fever-fit like ague, which, however, changed to an intermittent, and the chicken completely recovered.

Pairing and Hatching Fever.

The most decidedly feverish symptoms, very frequently observed in fowls, occur at the period of hatching, when the animal heat becomes so much increased, as to be remarkable to the touch when the hen is caught.

Many methods are adopted to stop this fever, when it is not desirable that the hen should hatch, but continue to lay. It is common, for example, in the country, to turn the hen rapidly round about, to render her giddy, which will of course, for a short time, diminish the velocity of the blood, and consequently abate the fever. I tried the fresh leaves of foxglove (*Digitalis*), with the same view, but without success. Others plunge the hen several times in cold water, or, what is better, let water fall on her from a pump, or otherwise. What I have found most effectual was, cooping the hen up for a few days and nights on the cold ground, or shutting her out from the nests at night, and compelling her to roost in the yard.

A feverish state also takes place about the time hens begin to lay, but is of little consequence to fowls otherwise healthy, though it will be certain to increase any other disorder which may have previously affected them. If they appear very hot and restless, they may have

plenty of green food or scalded bran, or soaked bread, or in more extreme cases, may be plunged into, or sprinkled with, water, to allay the fever.

INFLAMMATION.

INFLAMMATION may be popularly, if not strictly, considered as consisting of blood accumulated in the blood-vessels beyond their due proportion, and this may take place either in the external or the internal parts. One of the most important internal inflammatory affections of fowls, namely, that of the lungs, has been already copiously noticed above, in the experiments of M. Flourens. We shall draw, from the same excellent source, an account of an external inflammation of the eyes, which may lead to some practical utility in the suitable housing of fowls.

INFLAMMATION AND ULCERATION OF THE EYES.

ONE of six of the twenty-three chickens which M. Flourens shut up, so as to guard them against cold, was stated in a preceding page to have died of a disorder of the eyes, and another to have lost an eye. The disorder consisted of small abscesses which were formed on the cornea, containing a whitish sort of pus. Sometimes the inflammation extended to the whole globe of the eye, the eyelids swelling to an enormous size, and then accumulating under them a coagulable albuminous matter, similar to white of egg. The cornea subsequently sloughed off, and the eye was consequently

emptied of its tumours, and vision was destroyed for ever, causing in one blindness, and in another death, while in a third the abscess healed spontaneously.

This disorder of the eyes was no doubt owing to the concentrated vapours of the place where the fowls had been shut up ; but it is also often produced in a manner not less distressing, by cold, and particularly moist cold.

“ During the rains in the winter of 1826 and 1827,” says M. Flourens, “ the poultry-yard which furnished my observations was much below the level of the soil, and constantly flooded with water. The greater part of the hens, and particularly the young hens, were affected with abscesses of the cornea, and inflammations of the globe of the eye, to the degree that many of them lost their eyes. The effect of the humidity and cold did not stop here. Along with the abscesses of the cornea, enormous tumours frequently appeared on the head ; these tumours broke, and discharged most copiously a sort of sanious pus ; and almost uniformly the fowl fell a victim to the disorder. Many fowls were, at the same time, seized with acute rheumatism and sciatica *.”

RHEUMATISM.

I HAVE seen these rheumatic affections among my fowls even at Midsummer, after much wet, and more than once, as a consequence of plunging them in water

* Annales des Sciences, Septembre, 1829.

for the hatching fever. This ought to be treated in the same manner as consumption, by warmth, and cooling, opening food.

GOUT.

THIS disorder is less common among fowls than it would be, were it not that they are seldom allowed to live long enough for it to make its appearance, since it rarely attacks any except those which are rather old. It manifests itself by swelling of the joints, but it is, in most cases, not worth while to attempt a remedy. Sulphur, mixed with scalded bran, or soaked bread, may be given with advantage.

THE BRAIN AND NERVES IN FOWLS

IN fowls, the brain consists of two distinct tubercles: the two first, answering to the cerebrum, are devoid of convolutions, while the one answering to the cerebellum, is marked by cross parallel streaks. In several other respects the brain of fowls differs from that of man and of quadrupeds.

APOPLEXY.

THIS is a very frequent disorder among fowls, for the nature of which I must again have recourse to the scientific researches of M. Flourens. He says there are two degrees of apoplexy among fowls, one deep-

seated, and the other superficial, each having different symptoms. Deep-seated apoplexy is characterised by complete disorder of movement, while superficial apoplexy is manifested only by deficient muscular energy and instability in walking. Deep-seated apoplexy is accompanied by superficial apoplexy ; but, as the latter is the precursor of the former, it ought to be carefully attended to, to prevent its passing to what may be termed the second stage, though both stages are capable of being cured by a natural process, as individual cases prove.

M. Flourens had brought to him, on the 12th of April, 1823, a young fowl, whose gait indicated that of a tipsy animal so much, that the peasants called it the tipsy hen. Whether standing, walking, or running, it reeled and staggered, advancing always in a zigzag manner, frequently turning to the right, when it wished to turn to the left, and to the left when it wished to turn to the right ; and instead of going forwards it went backwards, and backwards instead of forwards. Its legs also often bent under it, so that it fell down ; above all, when it flew high up to perch, it could not govern nor regulate its movements, but fell and rolled about on the ground a long while, without being able to get upon its legs or recover its balance. These movements so nearly resembled those which had been produced by experiment, that M. Flourens was impatient to examine the brain. He found the bone of the skull to be covered with black carious points. On penetrating the dura mater, a quantity of clear water ran out, while the

cerebellum was yellowish, with rust-coloured streaks on the surface, and in the centre was a mass of purulent coagulated matter, as large as a horse-bean, contained in a cavity perfectly isolated, and having its sides very thin and smooth.

In 1828, there was a cock in the Menagerie of the Jardin du Roi at Paris, which was affected with symptoms somewhat similar to those of the fowl just mentioned, but it was not so bad as it had been before M. Flourens first saw it, having had leeches applied to the nape of the neck, by which it was much improved. Its movements, instead of being hasty and abrupt as in the tipsy fowl, were calm and slow, as if made with difficulty, or caused by indolence, but they were not the less disturbed and unbalanced. If it stood erect, its legs instantly bent under it; if it walked, there appeared a hesitation and disorder in its motions; it was observed to stagger, and sometimes, when it walked quick, it lost its balance and fell. When it pecked, its beak rarely struck truly, and it missed the grain. Its head and neck were in an almost continual oscillatory motion. This cock died the beginning of August, when, on opening the skull, the sinus of the brain was found to be bulged and gorged with blood; the lobes were of their natural colour, but the cerebellum was of a rose colour, with a number of red points on its surface, as if made by the prick of a pin. The interior was healthy and sound, shewing that it was a case of superficial apoplexy.

Dr. de Sala brought to M. Flourens, from Madame

Rousseau, of Pecq, near Paris, a young cock, which had died of a disorder that appeared singular. This cock could not stand upright for any time without reeling on its legs, and it staggered when it attempted to walk or run ; its neck always trembled or oscillated, particularly when it stretched it or its body ; but when its head or beak were supported, the oscillation ceased.

This is evidently the same disorder which Dr. Bechstein terms *Epilepsy*, and Mr. Clater, the *Megrims* or *Giddiness*. The latter says that "Many promising chickens are lost in this complaint. Without any kind of warning, they fall, roll on their backs, and struggle for a minute or two, when they rise stupid and giddy, and slowly return to their food. One fit having occurred, is soon followed by others, each more violent than the preceding, until at length the little animal staggers about half unconscious, refusing to eat, rapidly wasting, and soon dies convulsed. In some cases, the megrims occur when the fowl is poor and half-starved ; but then the food has been improper ; it has been watery or disposed to fermentation ; diarrhoea has followed, and the fits are the consequence of intestinal irritation. Other young fowls will have occasional fits, from which they will rapidly recover, and appear to be little or nothing the worse. The megrims," he adds, "must be stopped as soon as possible. Castor oil and syrup of ginger will be a very good medicine, and be much improved by syrup of white poppies added to it. The fowl that has once had the megrims should be confined for some

days, but in a tolerably large place, where it may obtain some degree of exercise."

This treatment, it may be observed, proceeds upon a total ignorance of the seat of the disease, as so well proved by M. Flourens. Dr. de Sala adopted the best possible method of cure, by applying leeches to the nape of the neck. The food should be light and scanty, and the affected fowl should be confined in a rather dark coop.

MELANCHOLY AND MOPING.

UNDER the term melancholy, some of the old writers mention the very common symptoms of want of appetite, drooping, and other secondary effects of indigestion, which always, more or less, affect the nervous system.

The remedies already pointed out under want of appetite and costiveness, ought to be attended to; and if any of the secondary symptoms become more prominent, the remedies adapted for nervous affections will be proper.

EXTERNAL DISORDERS AND ACCIDENTS.

As I cannot conveniently arrange the disorders now to be considered with the same regard to systematic order as the preceding, I shall treat the subjects as they occur to memory, under the heads of Moulting, Loss of

Feathers, Vermin, Wounds and Ulcers, Fractures and Dislocations, and Obstruction of the Rump Gland, popularly, but improperly, termed *Roup*.

MOULTING.

ALTHOUGH moulting is a natural and annual occurrence, it rarely passes without more or less disorder, and not unfrequently proves fatal, so that fowls require to be carefully attended to at the time of their moult. It is most dangerous and most frequently fatal to young chickens, particularly those of late broods, during the occasional cold and rainy weather at the close of autumn, their being late hatched throwing the time of moulting late; whereas those that are hatched early in spring, moult in the warm days of July and August, and on that account are not so apt to suffer. The summer moult is for the most part gradual, a few feathers falling at a time, and being renewed till the whole plumage undergoes a change. In the autumnal moult, on the contrary, more of the feathers fall off at once, and as the fresh ones do not grow so readily, on account of the weather being colder, the fowls are rendered naked, and exposed to any accidental bad weather which may occur.

Dr. Bechstein judiciously remarks, with respect to wild birds, that their moulting time always happens when their food is most abundant; and as the loss of feathers is likewise attended by a loss of flesh, nature points out that they ought to have an additional supply of food till all danger is over.

Warmth is no less necessary than abundant and nourishing food ; and when the later broods of chickens fall off in their appetite, appear moping and inactive, their feathers staring and falling off till their rumps, sides, and thighs, show the naked skin, they must be prevented from getting out in cold mornings too early, and not permitted to be abroad after four o'clock in the afternoon. M. Chomel advises to squirt wine and milk-warm water over them ; but the Abbé Rozier shrewdly remarks, that the evaporation from this will do more harm by producing cold, than the momentary warmth it imparts will do good. M. Chomel advises, farther, to put some sugar in their water, and to give them millet and hemp-seed ; the latter, I am certain, must be excellent, though I have not tried it with my own fowls.

After the third year, it has been observed, that fowls begin to moult later every succeeding year, so that it is frequently as late as January before the older fowls come into full feather, and the weather being then cold, they are not in a laying state till the end of March, or later. The time of moulting continues, according to the age and health of the fowls, and also with reference to mild or cold weather, from six weeks to three months. I think I have observed, in some instances of late hatching, that the process is favourable to moulting. I had a fine silver hen which moulted so gradually after hatching that she appeared full of feathers during the whole time, and the only change to be observed, was the freshness of colouring and gloss in the new feathers.

LOSS OF FEATHERS.

It has been observed, that all birds kept in a state of confinement, are particularly subject to an extensive loss of feathers, rendering them naked and deplorable. This is altogether different from moulting, inasmuch as the fall of the feathers in the latter is occasioned by the new feathers shooting out from the skin, and pushing the old ones off, as is the case when young animals shed their teeth. In the disordered state in question, on the other hand, where the feathers fall, no new ones appear, or if they do, they seldom push far above the surface of the skin, but remain as mere stumps, arrested in their growth. It is a disorder apparently similar to that which in horses is termed *out of condition*, when the hair becomes shaggy, rough, and staring, and is constantly coming off.

As the disorder, termed loss of feathers, is evidently a constitutional, and not a local affection, it would be in vain to seek for remedies in external applications, though stimulants might perhaps aid the operation of internal medicines. Amongst the latter, such as are known to act on the skin, particularly brimstone and antimony, may be tried; but I cannot speak of their effects from experience, though I have had a considerable number of fowls, at various times, affected with the disorder. Good keep and cleanliness, plenty of fresh water, and an open range, will do more than any other treatment to restore the loss of feathers. Forge-

water, or water from the gas-works, might probably be of advantage, given as drink.

VERMIN.

BIRDS of all kinds, both wild and tame, are liable, from some unknown causes, to be attacked, as Herod the Jewish tetrarch is said to have been, with a particular sort of lice which are generated on them in myriads. I have seen instances of their covering the feathers so completely as to hide their natural colour, and in many places a pin's point could not have been put down without touching some of the vermin.

In the new edition of Clater it is said, that "vermin are often exceedingly annoying to the poultry, and materially prevent their growing and fattening. They are usually to be traced to evident neglect in the management of the poultry-yard. The fowls are half starved, or the place is all over filth, or there is no dry corner with plenty of dust or ashes in which the birds may roll themselves." It is added, "the only remedies are good food and cleanliness; and when the causes which encourage the multiplication of vermin are removed, the fowls will take care to keep them under by diligently picking them out."

All this is in direct opposition to my own observation; for the individual fowl infested with vermin rarely communicates these to the rest of the fowls in the same yard, though these be fed and lodged alike—

unless there be a constitutional disposition in some of the others to become infected. As well might it be maintained, because individual humble-bees and dung-beetles are often found infested with lice, that it is owing to starvation or confinement, though all the other bees in the same *byke*, and consequently under similar circumstances, as to lodging, shall be free. Is it want of cleanness, or confinement, which causes so many swallows and other wild birds to be infested with vermin?

In trifling cases, when the infection is not very obvious to casual inspection, no particular attention will be required. In bad cases, the sooner the fowls are killed the better, as there is no known remedy; for even were every one of the vermin killed, the vice of the constitution would soon attract others to breed.

Mascall says, "they get them in scraping abroad among foule strawe, or on dunghills, or when they sit in nests not made cleane, or in the hen-house by their dung lying long there, which corruptes their bodyes and breedes lice and fleas." The corrupting of their bodies, seems a much more probable cause than any of the others.

"The remedy," adds Mascall, "ye shall take the powder of pepper mixed with warme water and therewith bathe them; or take fine powder of stavesacre and mixe it with lye [urine], and so washe them therewith, or to bathe them in soap water, which is good to kill lyce, or the fine powder of pryvet mixte with

vinegar, and so washe them therewith*." These directions are as good as any in the more modern books.

WOUNDS AND ULCERS.

FROM fighting with each other, from having their feet cut with glass or gravel, and not unfrequently from the bites of animals, such as pole-cats, rats and the like, attacking them at night, serious wounds are sometimes produced, which, if neglected, may canker and produce foul ulcers not easily healed.

In all cases of such injuries, the first requisite is cleanliness. The wound ought to be cleared of all sand or dirt, bathed with warm water and milk, and the fowl shut up so as to prevent the others abusing it, for they are always ready to peck at any wound and increase the injury. If it do not readily heal, but go on to ulceration, it may be bathed with alum water or with ointment of creosote, which will be almost certain to heal it, even should it show fungous or *proud* flesh.

FRACTURES AND DISLOCATIONS.

WHEN fowls chance to have their legs broken or dislocated, unless they are of a very peculiar or valuable sort, and wanted for breeding, the best thing is to kill

* The Husbandlye Ordering and Governmente of Poultrie, practised by the learned. 12mo., London, 1581, chap. 21.

them at once. But in such a case as that recorded in the old song,—

I have a hen with a happity leg,
Lass gin ye lo'e me tell me noo,
That every day lays me an egg,
An' I canna' come ilka-day to woo,—

it may be worth while to preserve a fowl after an accident of this kind. The case must be treated according to what has already been stated under wounds, and more particularly under inflammation, which will be certain to ensue, more or less severely, both locally and constitutionally.

OBSTRUCTION OF THE RUMP GLAND.

It has already been mentioned, under *Roup*, that this term is sometimes applied improperly to obstruction of the rump gland. Even Mowbray says, "imposthume upon the rump is called *roup*." Before giving the correct view of this gland, it may be as well to state the common and very erroneous notion of it from Clater.

"It is well known," he says, "that there is a little tubercle or projection on the rump of every bird, and which is filled with oily matter. Its use is to smoothe and give a glossy appearance to the feathers, and more particularly to make them *water-tight*. When rain is coming every bird is diligently employed in squeezing out the greasy fluid, and rubbing it over the whole surface of his feathery coat, and then the drops of rain

trickle off without penetrating through, or in the slightest degree inconveniencing him."

In order to prove the inaccuracy of this popular and plausible notion, it will scarcely be requisite, as M. Réaumur justly remarks, to show how little the quantity of oil that may be daily supplied by the rump-gland is, in proportion to the extent of surfaces resulting from the assemblage of the numberless feathers with which a hen or a duck is covered; nor how long a time would be necessary to enable the gland to supply a quantity of the oil sufficient to besmear the surface of only one of those feathers. In order to explode a notion so universally espoused, it is enough to state, that the feathers of the variety of fowls called *rumkins*, which have no rump gland at all, are as much proof against rain as those of other fowls. The fact, notwithstanding, is correct, that fowls are observed pecking about their rumps, and this imposed upon careless observers, who did not consider that the point of the beak could never press out a quantity of oil sufficient to render itself greasy. "So long," says M. Réaumur, "as we shall be ignorant why a secretion is made in our ears of a certain waxy matter, though in a very small quantity, we shall not think ourselves obliged to give an account why a secretion of a certain matter is in a particular manner effected in very small quantity on the rump of fowls."

The rump gland frequently becomes obstructed, and in consequence inflames, swells, and of course occasions pain and uneasiness, extending, in bad cases, to the

whole rump. Clater says the remedy is simple : it is all loss of time to foment or apply cooling washes : the tumour must be opened at once, and the collected oil, now become purulent and diseased, squeezed out. If the wound does not readily heal, a little tincture of aloes may be applied.

Dr. Bechstein, on the other hand, says, that when the rump gland is thus destroyed, the fowls are certain to die the very next moult.

M. Réaumur thinks it will be the most rational treatment to clear, if possible, the obstructed outlet or duct of the gland, by means of a tent introduced into the orifice.

THE END.

LONDON :

BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.

